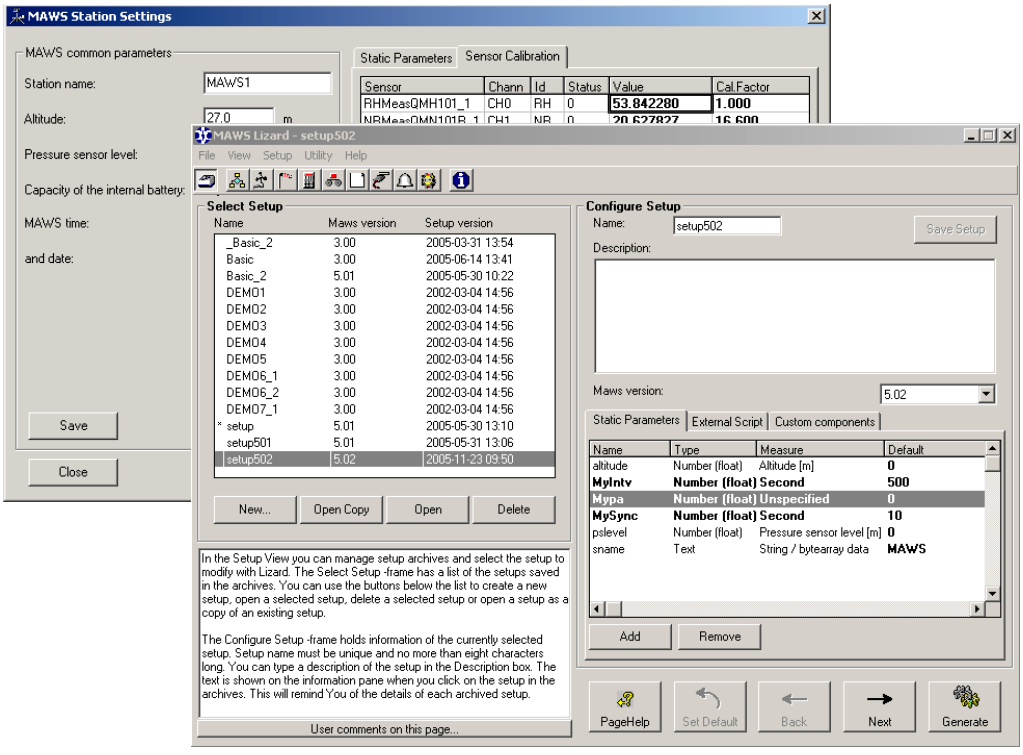
Configuration Guide to MAWS

TECHNICAL REFERENCE

M210511EN-A
November 2005


MAWS Station Settings
MAWS common parameters
Station name:
MAWS1
Altitude:
Pressure sensor level:
Capacity of the internal battery:
MAWS time:
and date:
Save
Close
Static Parameters
Sensor Calibration
Sensor
Chann
Id
Status
Value
Cal.Factor
RHMeasQMH101_1
CH0
RH
0
53.842280
1.000
MAWS Lizard - setup502
File View Setup Utility Help
Select Setup
Name
Maws version
Setup version
_Basic_2 3.00 2005-03-31 13:54
Basic 3.00 2005-06-14 13:41
Basic_2 5.01 2005-05-30 10:22
DEMO1 3.00 2002-03-04 14:56
DEMO2 3.00 2002-03-04 14:56
DEMO3 3.00 2002-03-04 14:56
DEMO4 3.00 2002-03-04 14:56
DEMO5 3.00 2002-03-04 14:56
DEMO6_1 3.00 2002-03-04 14:56
DEMO6_2 3.00 2002-03-04 14:56
DEMO7_1 3.00 2002-03-04 14:56
* setup 5.01 2005-05-30 13:10
setup501 5.01 2005-05-31 13:06
setup502 5.02 2005-11-23 09:50
New...
Open Copy
Open
Delete
In the Setup View you can manage setup archives and select the setup to modify with Lizard. The Select Setup -frame has a list of the setups saved in the archives. You can use the buttons below the list to create a new setup, open a selected setup, delete a selected setup or open a setup as a copy of an existing setup.
The Configure Setup -frame holds information of the currently selected setup. Setup name must be unique and no more than eight characters long. You can type a description of the setup in the Description box. The text is shown on the information pane when you click on the setup in the archives. This will remind You of the details of each archived setup.
User comments on this page...
Configure Setup
Name:
setup502
Save Setup
Description:
Maws version:
5.02
Static Parameters
External Script
Custom components
Name
Type
Measure
Default
altitude Number (float) Altitude [m] 0
MyIntv Number (float) Second 500
Mypa Number (float) Unspecified 0
MySync Number (float) Second 10
pslevel Number (float) Pressure sensor level [m] 0
sname Text String / bytearray data MAWS
Add
Remove
PageHelp
Set Default
Back
Next
Generate

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CHAPTER 1

GENERAL INFORMATION

About This Manual

This manual is intended for the users of MAWS Automatic Weather Station. It provides information for creating MAWS setups with more advanced features of MAWS Lizard and is thus supplementary to MAWS Lizard Setup Software User's Guide and other MAWS user's guides.

Contents of This Manual

This manual consists of the following chapters:

- Chapter **1**, General Information, provides important safety, revision and technical support contact information, as well as information on related documentation.
- Chapter **2**, Configuring Optional Hardware, contains information needed when configuring optional hardware. The optional hardware described in this chapter includes Vaisala Digital I/O Module and Nokeval 7470 Serial to Analog Converter.
- Chapter **3**, Managing Setups, provides additional information on setup management.
- Chapter **4**, Configuring Communication Options, chapter provides information on the Iridium satellite transmitter communications option, how to interface the Iridium satellite transmitter to MAWS, and how to use the Short Burst Mode in binary transmission.

- Chapter **5**, Configuring Calculations and Reports, provides additional information on configuring different MAWS Lizard calculations and reports.
- Chapter **6**, Configuring Sensors, provides advanced information on configuration and measurement control for different sensors.
- Chapter **7**, Configuring Serial Sensor Interfaces, contains information needed when configuring serial sensor interfaces, that is, connecting sensors that use serial communications to the MAWS301 weather station. Note that this chapter contains only instructions for configuring the interface, not the sensor itself.
- Chapter **8**, Alarms, provides information on output control using alarms.
- Chapter **9**, Additional Features, provides information on other features or enhancements to MAWS Lizard.
- INDEX

Version Information

Table 1 Manual Revisions

Manual Code	Description
M210511EN-A	This manual. Applicable for MAWS Lizard and Terminal and MAWS logger QML201 software from version 5.02 onwards.

Related Manuals

Table 2 Related Manuals

Manual Code	Manual Name
M010141EN	MAWS Lizard Setup Software - User's Guide
M210662EN	Vaisala HydroMet™ System MAWS301 - User's Guide
M010114EN	Vaisala HydroMet™ System MAWS301 - Installation Manual
M210708EN	Vaisala HydroMet™ System MAWS100 - User's Guide
M210630EN	Automatic Weather Station MAWS201 - User's Guide

Related information can also be found in several Technical References.

Feedback

Vaisala Customer Documentation Team welcomes your comments and suggestions on the quality and usefulness of this publication. If you find errors or have other suggestions for improvement, please indicate the chapter, section, and page number. You can send comments to us by e-mail: manuals@vaisala.com

General Safety Considerations

Throughout the manual, important safety considerations are highlighted as follows:

WARNING	Warning alerts you to a serious hazard. If you do not read and follow instructions very carefully at this point, there is a risk of injury or even death.

CAUTION	Caution warns you of a potential hazard. If you do not read and follow instructions carefully at this point, the product could be damaged or important data could be lost.

NOTE	Note highlights important information on using the product.

Recycling

	Recycle all applicable material.

	Dispose of batteries and the unit according to statutory regulations. Do not dispose of with regular household refuse.

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Technical Support

For technical questions, contact the Vaisala technical support:

E-mail helpdesk@vaisala.com

Fax +358 9 8949 2790

If the product needs repair, please follow the instructions below to speed up the process and to avoid extra costs to you.

1. Read the warranty information.
2. Contact Vaisala technical support via e-mail or fax and request for RMA (Return Material Authorization) and shipping instructions.
3. Proceed as instructed by Vaisala technical support.

NOTE	RMA must always be requested from Vaisala technical support before returning any faulty material.

CHAPTER 2

CONFIGURING OPTIONAL HARDWARE

This chapter contains information needed when configuring optional hardware. The optional hardware described here includes Vaisala Digital I/O Module and Nokeval 7470 Serial to Analog Converter.

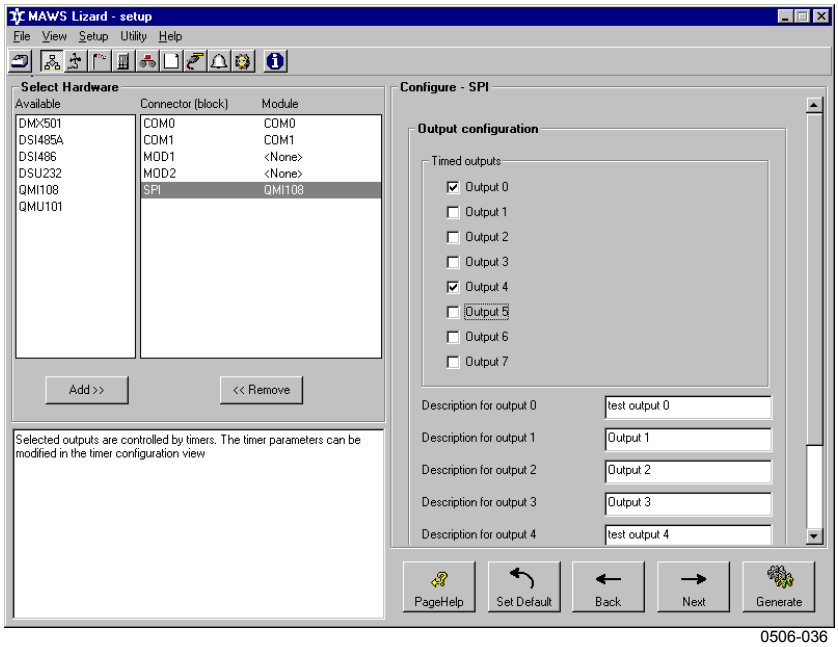
Digital I/O Module

Digital I/O Module QMI108 is used to extend the I/O capacity of MAWS. It is equipped with eight inputs and eight outputs. It interfaces to the logger via the SPI connector. The module is located inside the MAWS enclosure beside the MAWS logger, and it conforms to the same environmental immunity and emission standards as the logger.

For further information on the module, refer to Vaisala HydroMet™ System MAWS301 User's Guide.

Configuring Digital I/O Module QMI108

1. Add the Digital I/O Module QMI108 to the setup in the **Hardware Setup** view of MAWS Lizard. You can also select which outputs are controlled by timers and name the outputs in the **Description for...** text boxes, see Figure 1 on page 10.

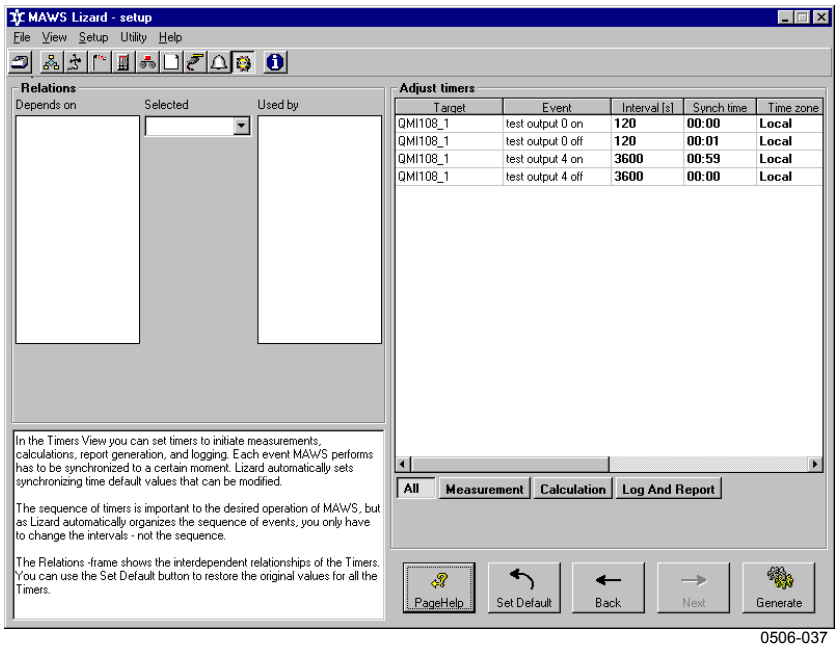


0506-036

Figure 1 Hardware Setup View: Digital I/O Configuration

2. Proceed to the **Timers** view to configure the on/off cycle for the selected outputs (0 and 4).

   See Figure 2 below for an example of the **Timers** view:


MAWS Lizard - setup
File View Setup Utility Help
Relations
Depends on
Selected
Used by
In the Timers View you can set timers to initiate measurements, calculations, report generation, and logging. Each event MAWS performs has to be synchronized to a certain moment. Lizard automatically sets synchronizing time default values that can be modified.
The sequence of timers is important to the desired operation of MAWS, but as Lizard automatically organizes the sequence of events, you only have to change the intervals - not the sequence.
The Relations -frame shows the interdependent relationships of the Timers. You can use the Set Default button to restore the original values for all the Timers.
Adjust timers
Target Event Interval [s] Synch time Time zone
QMI108_1 test output 0 on 120 00:00 Local
QMI108_1 test output 0 off 120 00:01 Local
QMI108_1 test output 4 on 3600 00:59 Local
QMI108_1 test output 4 off 3600 00:00 Local
All
Measurement
Calculation
Log And Report
PageHelp
Set Default
Back
Next
Generate

0506-037

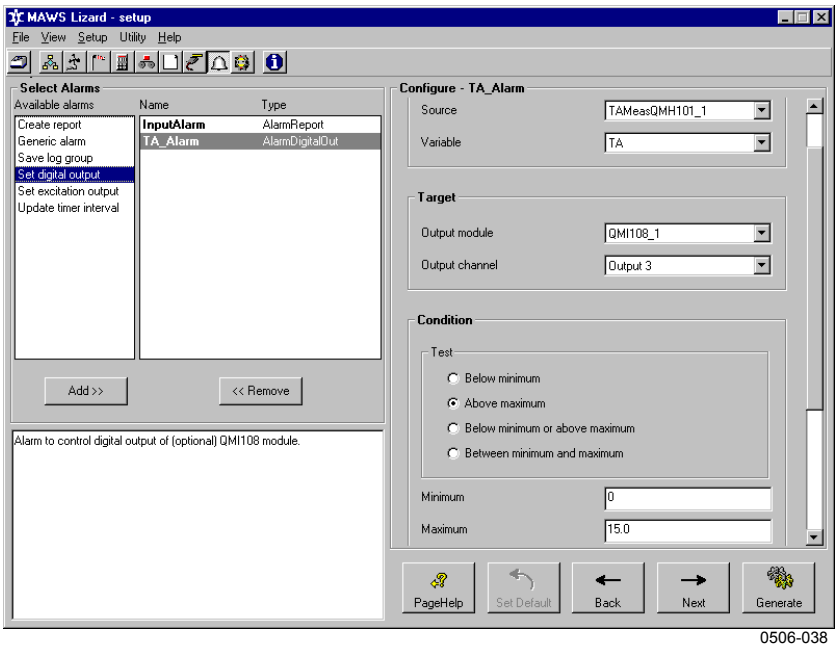
Figure 2 Timers View: Timer Configuration for the Digital Outputs

In the example, the configuration is as follows:

- Test output 0 toggles between on and off in a one-minute cycle.
- Test output 4 is on for one minute before each full hour.

Alternatively, you can control the outputs with alarms, for example, by activating the output signal when the alarm condition is met. Proceed as follows:

1. Configure the alarm condition in the **Alarms** view, see Figure 3 below for an example:



0506-038

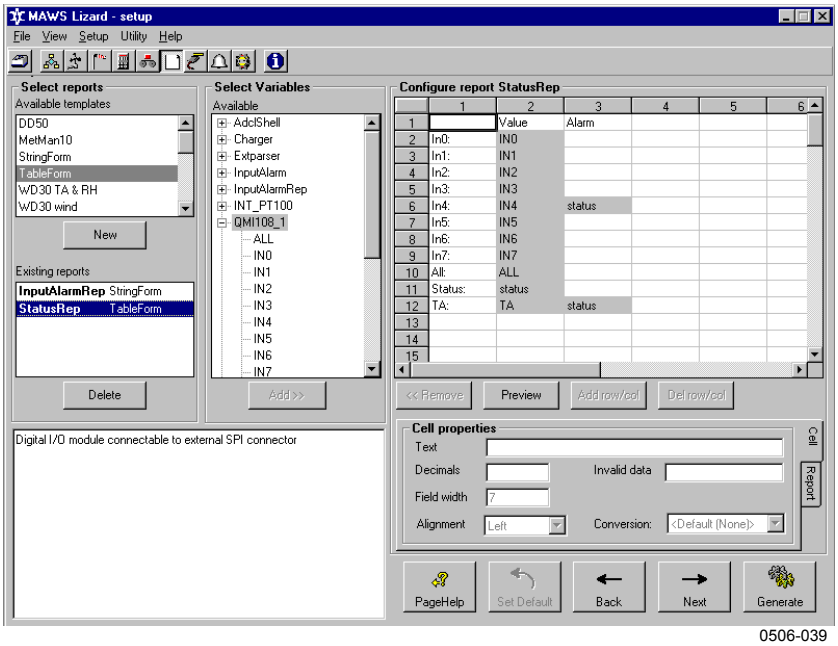
Figure 3 Alarms View: Controlling Digital Output Using Alarm

In the example, the configuration activates output 3 when the air temperature measured by the QMH101 sensor rises above +15 °C.

The inputs of the Digital I/O Module can be used like any other application variables, that is,

- for reporting,
- for logging,
- as an alarm input.

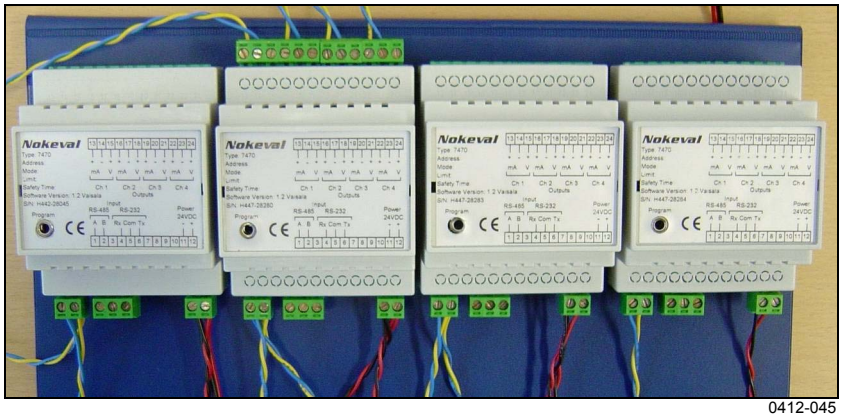
In the **Reports** view, the input statuses are available as individual variables **IN0** through **IN7** and combined as bits into a single status word **ALL**. The input module **status** is also available as for the sensors, refer to Figure 4 below.



0506-039

Figure 4 Reports View: Digital Inputs in the Report

Nokeval 7470 Serial to Analog Converter



0412-045

Figure 5 Nokeval Serial to Analog Converters

Nokeval 7470 Serial to Analog Converter is used for converting a predefined ASCII message to one or more voltage or mA outputs. This kind of conversion may be required, for example, when weather information is needed in automation systems where only voltage or

current inputs are used instead of a serial data interface. The converter can be controlled through an RS-485 serial line.

As Nokeval converters are fully configurable, knowledge on these devices is required before taking them into use with MAWS. It is possible to add one or more converters to a single RS-485 serial line with MAWS.

For further details, see the applicable Nokeval user's manual, available at www.nokeval.com.

Configuring Communication Port of Nokeval 7470

One or several Nokeval devices are connected to MAWS through an RS-485 communication port. The device can be connected to the following RS-485 ports:

- Integrated RS-485 port (COM1)
- DSI485A Isolated RS-485 port (2-wire or 4-wire connection)

In the **Optional Hardware** view of MAWS Lizard, configure the selected RS-485 port as follows:

1. In the **Line parameters** frame**,** leave the default values (*9600*, *8*, *1*, *None*), unless the Nokeval device is to be otherwise configured. See Figure 6 on page 14.
2. In the **Wiring options** frame, select the *Two wire* connection type from the list (DSI485A only).
3. Leave all options unselected in the **Handshake options** frame.

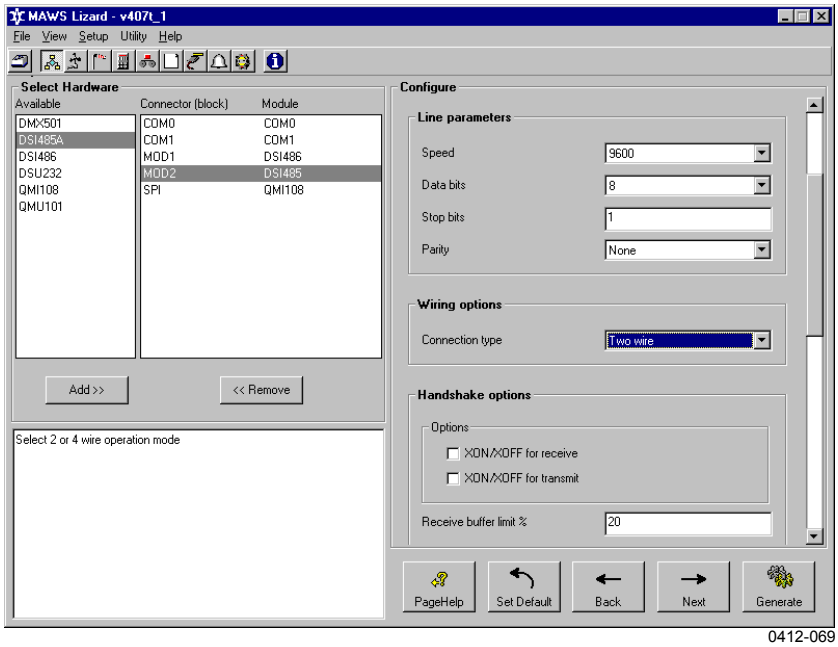
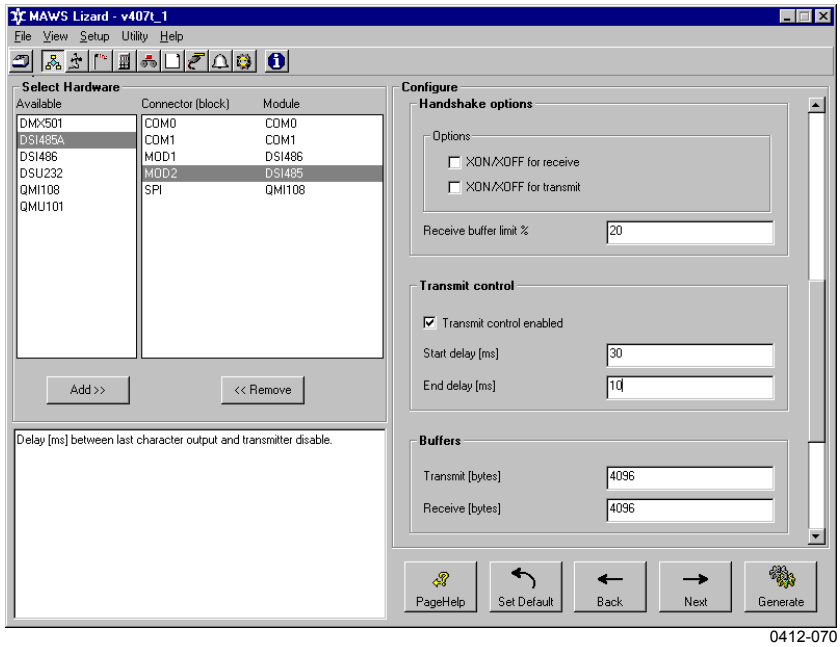


Figure 6 Hardware View: Configuring Communication Port for Nokeval 7470 (1/2)

4. In the **Transmit control** frame, select **Transmit control enabled** and set the timing as follows in the editable text boxes, see Figure 7 on page 15:

   - **Start delay (ms)**: 30
   - **End delay (ms)**: 10

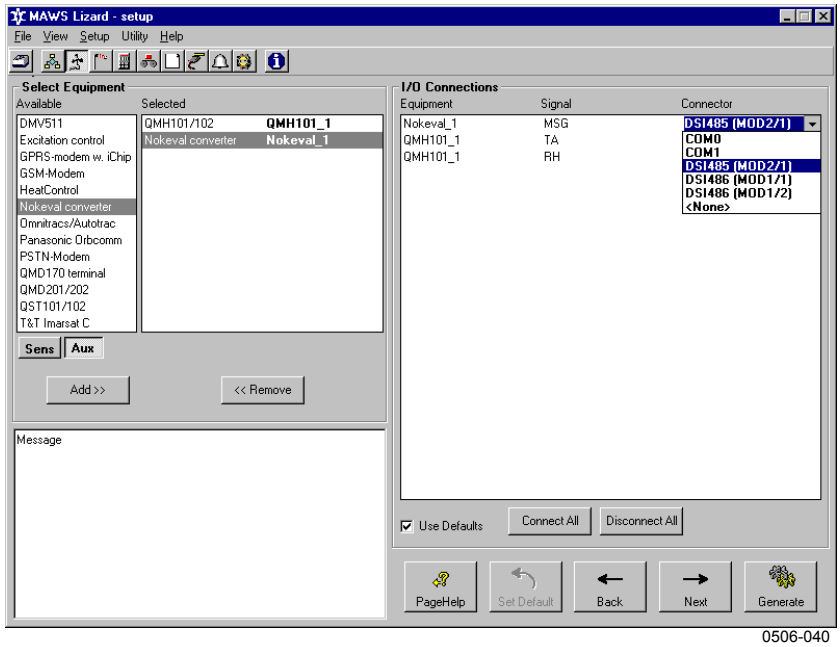


0412-070

Figure 7 Hardware View: Configuring Communication Port for Nokeval 7470 (2/2)

5. In the **Buffers** frame, leave the default values.

6. Proceed to the **Equipment** view, see Figure 8 below:



0506-040

Figure 8 Equipment View: Connecting Nokeval 7470 to Serial Port

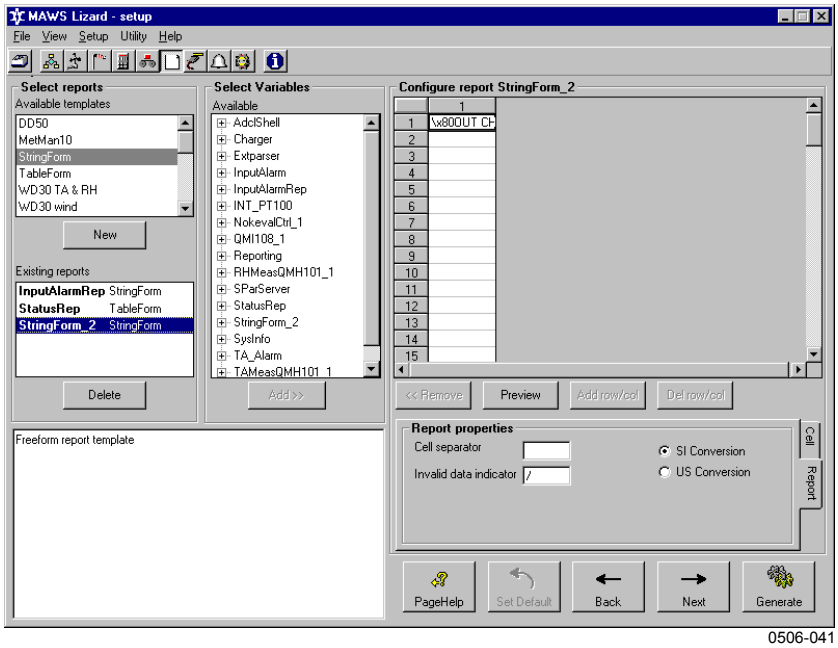
7. Select Nokeval Converter from the **Aux** list and connect it to the selected serial port. Add only one Nokeval Converter to the serial port here, even if there are several devices connected to this serial line.

NOTE	Do not connect more than one Nokeval Converter to one serial port in the **Equipment** view. If there are several devices connected on the serial bus, they are using the same port and they are addressed in the reports as described in the following sections.

Configuring Data Values of Nokeval 7470

Data is sent to the Nokeval converter through a report containing a valid Nokeval command with data values. In the **Reports** view of MAWS Lizard, create a separate *StringForm* report for each command to be sent. Proceed as follows:

1. Set a space character as the cell separator of the report.
2. The first cell must contain the address of the Nokeval device to which the command is sent, followed by a valid Nokeval command. For example, **\x80OUT CH 1**. See Figure 9 below:



0506-041

Figure 9 Reports View: Setting Up Report for Nokeval

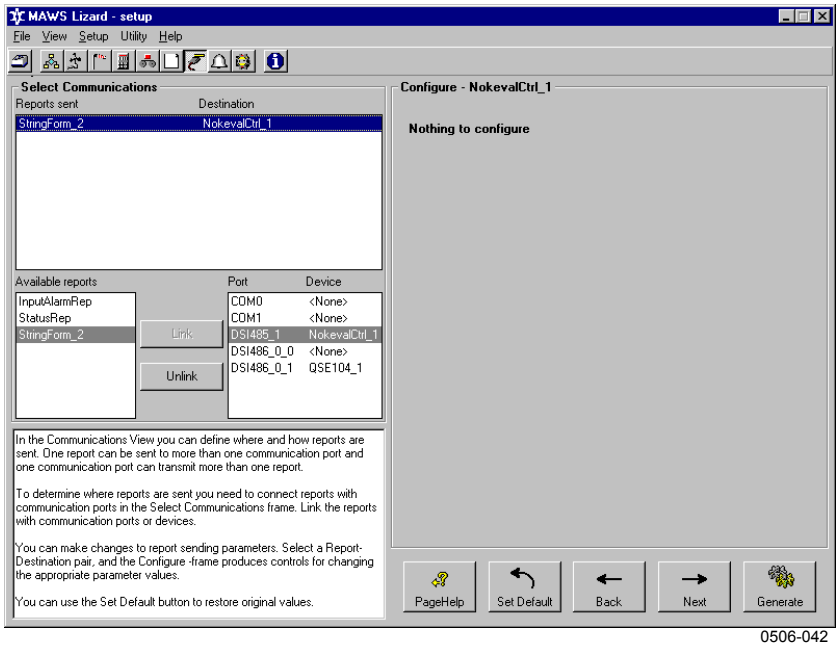
Give the address as an 8-bit hexadecimal value where the highest bit is always set. The hexadecimal value is given in the report using the special character code **\x**. For example, if the device address is 0, then the first report field should start with **\x80**. If the device address is 2, then the field starts with **\x82**.

3. Give the Nokeval command, excluding the data value, directly after the address. Note that you may not enter a space or any other character between the address and the command. For detailed information about valid commands, refer to Nokeval user's guide.

   The subsequent field(s) contain the data value(s) of the command. These may be, for example, measurement or calculation results. For details about invalid data handling and scaling of data, see the sections on page 18.

   The ETX character and the checksum are automatically added to each command by MAWS and therefore they are not allowed to be included in the report.

4. Proceed to the **Communications** view.
5. Link the reports to the Nokeval device, see Figure 10 on page 18.


MAWS Lizard - setup
File View Setup Utility Help
Select Communications
Reports sent
Destination
StringForm_2
NokevalCtrl_1
Configure - NokevalCtrl_1
Nothing to configure
Available reports
Port
Device
InputAlarmRep
StatusRep
StringForm_2
Link
Unlink
COM0 <None>
COM1 <None>
DSI485_1 NokevalCtrl_1
DSI486_0_0 <None>
DSI486_0_1 QSE104_1
In the Communications View you can define where and how reports are sent. One report can be sent to more than one communication port and one communication port can transmit more than one report.
To determine where reports are sent you need to connect reports with communication ports in the Select Communications frame. Link the reports with communication ports or devices.
You can make changes to report sending parameters. Select a Report-Destination pair, and the Configure -frame produces controls for changing the appropriate parameter values.
You can use the Set Default button to restore original values.
PageHelp
Set Default
Back
Next
Generate

0506-042

Figure 10 Communications View: Connecting the Report to Nokeval 7470

Scaling of Data

All data values must be properly scaled to fit into the output range of the Nokeval converter outputs. You can carry out the scaling using two alternative methods:

- Configuring MAWS to scale the data. This is performed using a **User definable conversion**, configured in the **Calculations** view of MAWS Lizard.
- Configuring the Nokeval converter to scale the data. Refer to Nokeval user's guide for details.

Handling of Invalid Data

MAWS will not send a command if the data value is invalid, that is, the report includes the character '/'. The Nokeval converter can be configured to invalidate the output if no command has been received within a specified time (see Nokeval user's guide for details). Therefore, the system can be configured so that an invalid data value will invalidate the analog output of the converter. In this case, a separate report should be used to control each analog output, that is, the **OUT CH** command should be used, instead of the **OUT SCAN** command.

Alternatively, any specific data reading can be sent when the data value is invalid, by specifying an **invalid data** indicator for the data cell in the report.

Timing of Reports

Up to 32 reports can be generated successively at the same synchronization time. MAWS will queue the commands and process them one by one.

If more than 32 reports are needed, the synchronization times of the report generation events must be adjusted so that no more than 32 commands will overlap each other.

Error Indicator

There is a variable available indicating the number of errors occurred within the previous queue of Nokeval commands, that is, while processing the queue of reports sent at the same synchronization time. When no errors have occurred, this variable has the value 0, otherwise it indicates the number of failed commands. This variable of the NokevalCtrl software component is named **fails**. It can be used, for example, to generate an alarm in case an error occurs in communication.

Table 3 Nokeval 7470 Specifications

Parameter	Value/Description
Current output:	Common negative wire
Outputs	0 ... 20 mA, 4 ... 20 mA
Maximum load	600 Ω
Voltage output:	Common negative wire
Outputs	0 ... 5 V, 0. ... 10V
Maximum load	1 mA
Accuracy	0.1 % of span
Linearity	0.06 % of span
Temperature effect	0.005 % of span / ºC
Response time of output	4.7 ms + response time 67 % of end value
	12.5 ms + response time 93 % of end value
	150 ms + response time 100 % of end value
RS-485/RS-232 input	Both selectable in terminals
	Galvanically isolated from outputs
	Nokeval SCL protocol
DAC conversion	12-bit (resolution 4096)
Power supply	18 ... 28 VDC
Power consumption	30... 110 mA
Power demand	max. 2.6 W
IP protection	20
Mounting	DIN rail (35 mm)
Weight	140 g

CHAPTER 3

MANAGING SETUPS

This chapter provides additional information on setup management.

Setup Memory Size

For software version 5.0.1 or higher, the size of the setup memory is 224 kilobytes, allowing you to create also larger setups. The internal logging memory size is 1 638 400.

Executing a Setup File from Compact Flash Memory Card

With the MAWS software version 5.01 or higher, you can execute a setup file (a configuration) directly from the Compact Flash (CF) card. This is especially useful when testing new configurations.

Typically, a MAWS configuration is created using MAWS Lizard and uploaded into the MAWS logger using the MAWS Terminal software. With the MAWS software version 5.01 or higher, you can test new configurations in an alternative way. After you have created a new configuration, you can copy the setup file (or several files) to the CF memory card to be executed in the MAWS logger.

This requires that the boot code version of your logger is 4.07 or higher. The boot software is independent of the firmware software. In order to check the boot version, give the **SYSINFO** command in MAWS Terminal. In case your boot code version is lower than 4.07 and you wish to use this new feature, please contact Vaisala

HydroMet HelpDesk. You will need to send your logger to Vaisala for the update.

Currently there are external memory cards available from 32 megabytes (MB) up to hundreds of megabytes. Memory cards over 64 megabytes are not recommended by Vaisala. Cards can be read directly in the PC. Several different types of readers are commercially available: internal PCMCIA reader as well as external readers to be connected to USB or parallel port of a PC. Vaisala recommends the usage of industrial grade 32 MB and 64 MB CF cards from SanDisk, that have been tested to function in harsh environments.

Note that the CF memory card must be formatted in MAWS before use. To format the card, insert it into the CF slot of MAWS. Give the **EXTFS** *ERASE* command. After the card has been formatted, you can remove it from the slot and carry out the copying of the setup file(s) in your PC.

The setup file can be located in any MAWS logger directory but in order not to exceed the maximum path length, Vaisala recommends that you store the file either in the root directory or in the first one below the root.

NOTE

The maximum number of characters allowed in the path name is eight (8).

The maximum number of characters allowed in the file name is eight (8), and the maximum number of characters allowed in the file name extension is three (3), as in MAWS Lizard.

If you want to test several configurations, you can copy all of them to the CF card at the same time. However, only one setup file will be executed at a time.

In order to test a new configuration by executing the setup file from the CF card, proceed as follows after you have formatted the CF card and copied the setup file:

1. Check that MAWS includes a boot code version 4.07 or higher. Use the **VER** command or the **SYSINFO** command to check the version.
2. Insert the Compact Flash card into the Compact Flash slot of MAWS.

3. To check that a configuration exists, give the following command in MAWS Terminal. Note that MAWS uses a UNIX/LINUX type file system with only one root and thus automatically mounts the CF card on the /Ext/ directory path.

   dir /Ext/<*pathname*>

   where

   pathname = The directory used

4. Use the **reset** command to launch a new startup with the setup file to be tested:

   reset [*delay*] /Ext/<*setup file*>

   where

   delay = The period of time (in seconds) before MAWS resets. The value of the *delay* parameter can be 0, which causes an immediate reset.

   setup file = The path and filename without drive identification

For example, if you have copied the *setup501.adc* setup file to a directory named *test*, give the following command to launch the new startup:

reset 0 /Ext/test/setup501.adc

NOTE	Note that the directory separator (/) is not the same as in the DOS prompt. Make sure to enter the pathname as presented in the example above (/Ext/).

An example output from MAWS after selecting a setup file to be executed from the CF card is as follows:

```
/ W> dir /Ext/TEST
```

```
 .        rwxd 13:11:40 21.03.2005  0
 ..       rwxd 13:11:40 21.03.2005  0
 setup501.adc rw-- 12:26:28 21.03.2005  1776

Files shown: 3  Bytes used: 1776


/ W> reset 0 /Ext/TEST/setup501.adc
Resetting device in 0 seconds
COM0: QML201 Startup - Warm Boot
Serial #        : Z402074
Hardware        : Rev B-001
Software        : 5.01     Checksum  : 00000000
Boot sw version : 4.07
System RAM      : 2048kB
Free memory     : 1768kB
Internal temp.  : 23.15'C
Active errors   : NO
Active warnings : NO
Piggyback - 0   : DSU232 rev: B serial no: 008232
Piggyback - 1   : DSU232 rev: B serial no: 003523
NEW flash checksum (02400000 to 025FFFFF) is BBCC1130
Found  setup /Ext/TEST/setup501.adc

Starting to execute setup

Setup running ok
```

Quick Reference:

You can also copy a setup file to the CF card and take it into use by giving only one command. When entering the following command, MAWS will overwrite the original setup file in the */Cfg* directory. The new setup will thus be available after each restart.

reset [*delay*] /Ext/<*setup file*> copy

For example, to copy and to take into use the *setup501.adc* setup file, give the following command:

reset 0 /Ext/test/setup501.adc copy

Executing an Alternative Setup File from Compact Flash Memory Card

You can execute an alternative setup file from the Compact Flash (CF) memory card. This is especially useful when upgrading new configurations remotely.

An alternative setup file will be executed if the primary setup file in the */Cfg* directory fails.

NOTE	You must set a specific static parameter to enable this. This also requires that there is a CF memory card in the MAWS logger.

Proceed as follows:

1. Check that MAWS includes a boot code version 4.07 or higher. You can use the **VER** command or the **SYSINFO** command to check the version.
2. Insert the Compact Flash card into the Compact Flash slot of MAWS.
3. To check that a configuration exists, give the following command:

   dir /Ext/<*pathname*>

   where

   pathname = The directory used

4. To set a specific static parameter to point to an alternative setup file (script), use the **SPSET** command. Alternativescript is the name of the static parameter to be used to store the path and filename.

   SPSET alternativescript /Ext/<*setup file*>

For example, if you want the *setup501.adc* setup file in the *test* directory on the CF card to be executed in case the primary (probably remotely downloaded) setup file fails, use the following command:

SPSET alternativescript /Ext/test/setup501.adc

To verify that the path is correct, give the **SPSET** command. An output from MAWS is as follows:

```
/ > SPSET

alternativescript = /Ext/test/setup501.adc
```

If an error occurs while executing the primary setup file, MAWS will check whether the static parameter **alternativescript** is set. If so, MAWS will be reset. After the reset, MAWS will check whether an alternative setup file exists. If the alternative setup file exists and is functional, MAWS will execute it. Now you have access to MAWS again and you can replace the erroneous primary setup file with a new one. After the next reset, MAWS will try to execute the primary setup file located in the */Cfg* directory.

An example output from MAWS when the primary setup file fails is as follows:

```
COM0: QML201 Startup - Cold Boot
Serial #        : Z402074
Hardware        : Rev B-001
Software        : 5.01     Checksum  : 00000000
Boot sw version : 4.07
System RAM      : 2048kB
Free memory     : 1768kB
Internal temp.  : 23.23'C
Active errors   : NO
Active warnings : NO
Piggyback - 0   : DSU232 rev: B serial no: 008232
Piggyback - 1   : DSU232 rev: B serial no: 003523
NEW flash checksum (02400000 to 025FFFFF) is BBCC1130


Found setup /Cfg/failing.adc
Verifying setup file CRC (7DD7036A)...OK
Starting to execute setup
Erroneous setup file
Runtime error [line:16] Parameter error 'DSI486_1_0'
COM0: QML201 Startup - Cold Boot
Serial #        : Z402074
Hardware        : Rev B-001
Software        : 5.01     Checksum  : 00000000
Boot sw version : 4.07
System RAM      : 2048kB
Free memory     : 1768kB
Internal temp.  : 23.23'C
Active errors   : NO
Active warnings : NO
Piggyback - 0   : DSU232 rev: B serial no: 008232
Piggyback - 1   : DSU232 rev: B serial no: 003523
NEW flash checksum (02400000 to 025FFFFF) is BBCC1130
Found () setup /Ext/TEST/setup501.adc
Starting to execute setup
Setup running ok
```

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CHAPTER 4

CONFIGURING COMMUNICATION OPTIONS

Iridium Satellite Transmitter

This chapter provides information on the Iridium satellite transmitter communications option, how to interface the Iridium satellite transmitter to MAWS, and more specifically, how to use the **Short Burst Mode** in binary transmission.

Iridium transmission using data calls can be used like any other modem. Thus, it has been possible to communicate through Iridium with MAWS in earlier release versions as well.

Iridium is the only data solution with a complete coverage of the Earth including oceans, airways, and Polar Regions. Iridium delivers the essential communications services to and from remote areas where no other form of communication is available. The Iridium constellation of 66 low-earth orbiting (LEO), cross-linked satellites operates as a fully meshed network and is the largest commercial satellite constellation in the world.

Short Burst mode (SBD) is a mechanism to deliver short data messages over the Iridium satellite network to the Internet. Each SBD message can be up to 1960 bytes in length.

For more information about Iridium communication, refer to www.iridium.com.

Configuring Iridium Transmission

Iridium transmission is configured using MAWS Lizard. Proceed as follows:

1. Start MAWS Lizard.
2. Open an existing setup in the **Setup** view or create a new one.
3. Proceed to the **Hardware** view by clicking **Next** to configure the serial transmission hardware, see Figure 11 below:

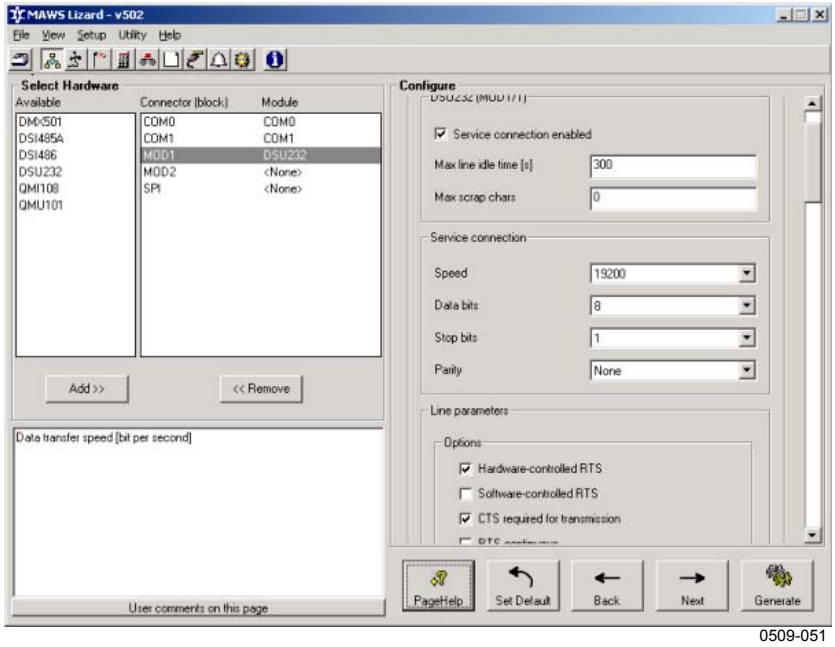


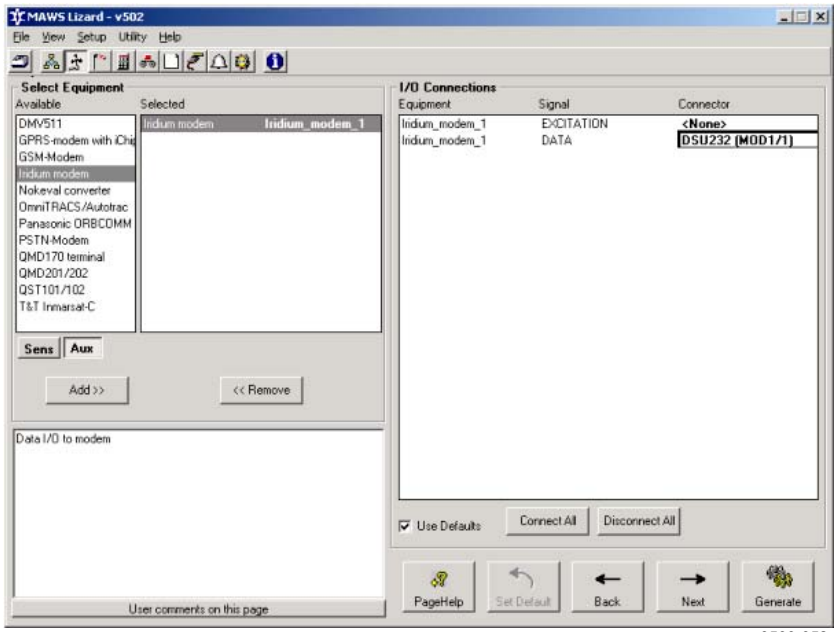
Figure 11 Hardware View: Selecting Configuration Options for DSU232 MOD1/1 for Iridium Transmission

In this example, MOD1/1 on DSU232 is selected for use with the Iridium sensor.

You are recommended to keep the default settings in the **Configure** frame:

Option	Default Value
Service connection enabled	selected
Speed	*19200*
Data bits	*8*
Stop bits	*1*
Parity	*None*
Hardware-controlled RTS	selected
CTS required for transmission	selected

4. Proceed to the **Equipment** view by clicking **Next**.
5. Click **Aux** to list the communication devices, see Figure 12 below.
   - Scroll down the **Available** list for Iridium.
   - Click the **Add** button and select Iridium.
   - Double-click the **Connector** list for *Iridium_modem_1* in the **I/O Connections** frame in order to select the COM port.
   - Leave the EXCITATION selection to <*None*>.



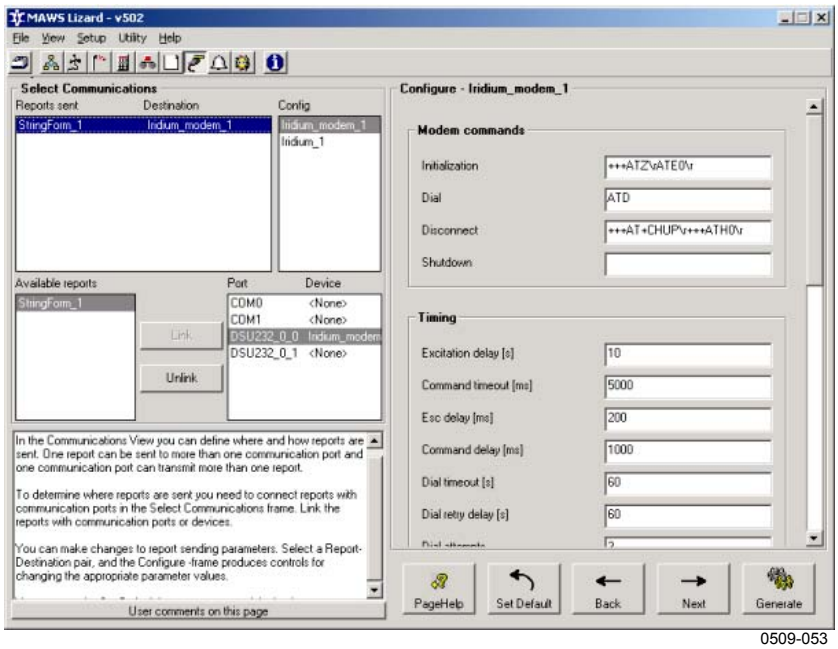
0509-052

Figure 12 Equipment View: Selecting I/O Connection for Iridium Modem

4. Proceed to the **Communications** view.
6. In the **Select Communications** frame, link a report to the Iridium mode, refer to Figure 13 on page 32.
   a. Select the report form from the **Available reports** list.
   b. Select a port having *Iridium_modem_1* as the device.

c. Click the **Link** button to make a connection between the report and the Iridium modem.

d. Modify the parameters in the **Configure** frame on the right.

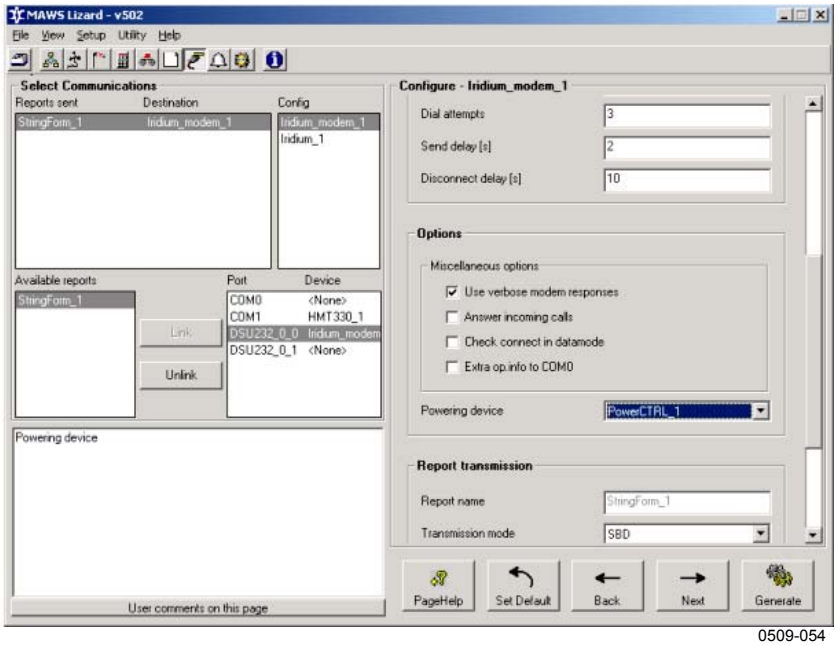


0509-053

Figure 13 Communications View: Configuring Iridium Transmission Parameters

In order to adjust the parameters, refer to Configuring Modem Options Technical Reference. As a default, the parameters are set for using Short Burst Data (SBD).

There is also a new option for powering the device only when sending a report, see Figure 14 on page 33.



0509-054

Figure 14 Communications View: Configuring Iridium Transmission Parameters Using Power Control Option

The **Powering device** option in the **Options** frame lists all the Power Control components in the setup. For more detailed information on how to use this option, see section Power Control Option on page 41.

7. Select the Short Burst mode in the **Report transmission** frame by choosing SBD from the **Transmission mode** list, see Figure 15 on page 34.

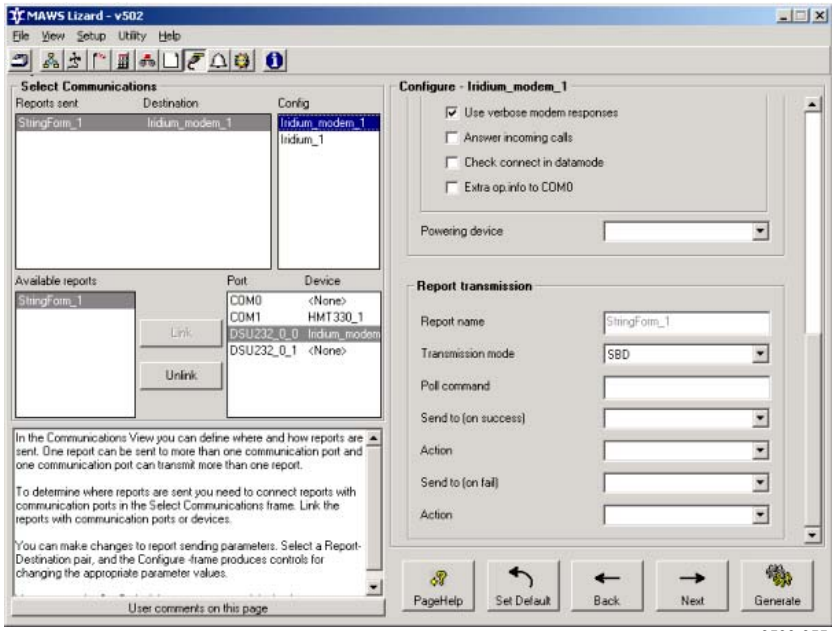


Figure 15 Communications View: Selecting Report Transmission Options for Iridium

For the other options, make the same selections as for any PSTN modem.

The fields **Send to** (**on success** and **on fail**) are currently used only when transmitting via SBD. You should leave the fields empty unless otherwise informed.

Iridium Configuration Options

There are also configuration options for Iridium. You can view them by clicking *Iridium_modem_1* in the **Config** frame.

If the **Read clock time from Iridium** option is selected, the Iridium clock counter is read when the SBD transmission has been done and MAWS time is set according to this counter, see Figure 16 on page 35.

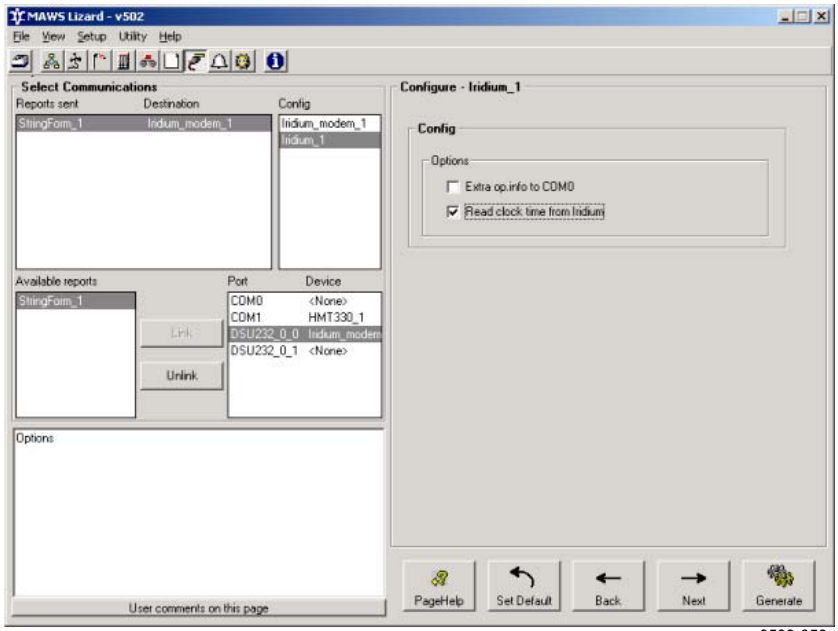


Figure 16 Communications View: Selecting Iridium Configuration Options

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CHAPTER 5

CONFIGURING CALCULATIONS AND REPORTS

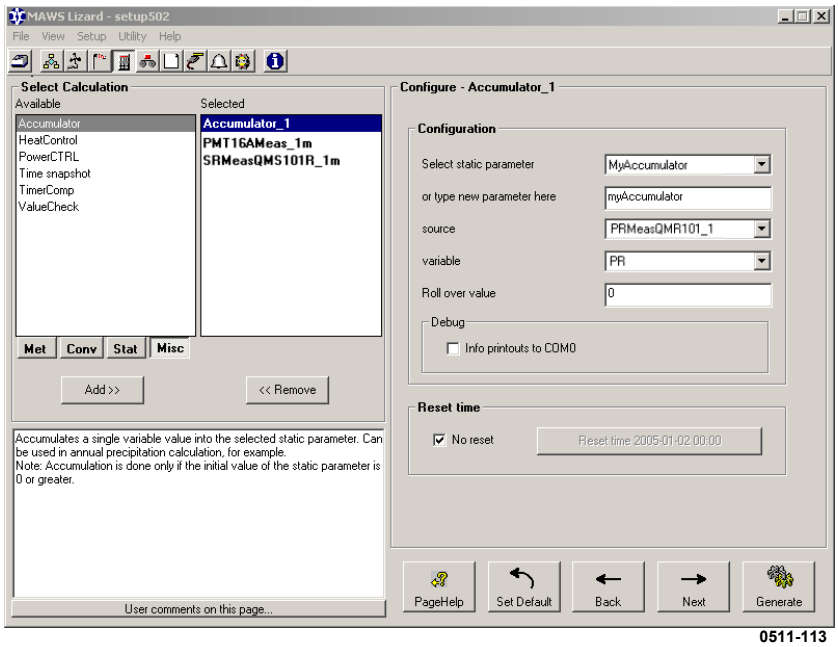
Accumulator with Predefined Reset Time

You can use the "Accumulator" component to add a source parameter to the destination parameter in order, for example, to accumulate annual precipitation in the MAWS system and to reset the calculation at a predefined moment.

The destination parameter is stored in the static parameters to maintain its value over reset or power shutdown. In addition, the destination parameter can be reset according to a predefined schedule. The Accumulator is always incremented when the source variable is measured.

To select the Accumulator component, proceed as follows:

1. In the **Calculations** view, choose Miscellaneous calculations (**Misc**) by clicking on the correct button below the **Available** list box, see Figure 17 on page 38.



0511-113

Figure 17 Calculations View: Selecting the Accumulator Component

2. Select the Accumulator in the list by clicking on the item name and then the **Add** button.

Configuring Accumulator

To configure the Accumulator, proceed as follows:

1. In the **Calculations** view, select a static parameter to be used in accumulation from the **Select static parameter** combo box which lists all the correct static parameters that are defined in the static parameter sheet. If there is no suitable parameter, you can create a new one by typing it manually in the editable text box.
2. Select the **Source** component and source **Variable** from the corresponding combo boxes. The increment source and variable indicate the source parameter to be added to the destination variable.

3. You can also choose a reset option (setting of the static parameter to zero at a selected time) in the **Reset time** frame. If you select the **No reset** check box, the destination parameter is incremented indefinitely unless you reset the Accumulator manually. If **No reset** is unselected, click on the **Reset time** button to select the resetting schedule.

   To select the reset schedule, proceed as follows:

   - Select the date and time for the reset in the corresponding frames of the **Select time** view. Use the **Time base** frame to select whether the reset follows Local or UTC time.
   - Select a reset interval (how often resetting occurs) in the **Recurrence options** frame.

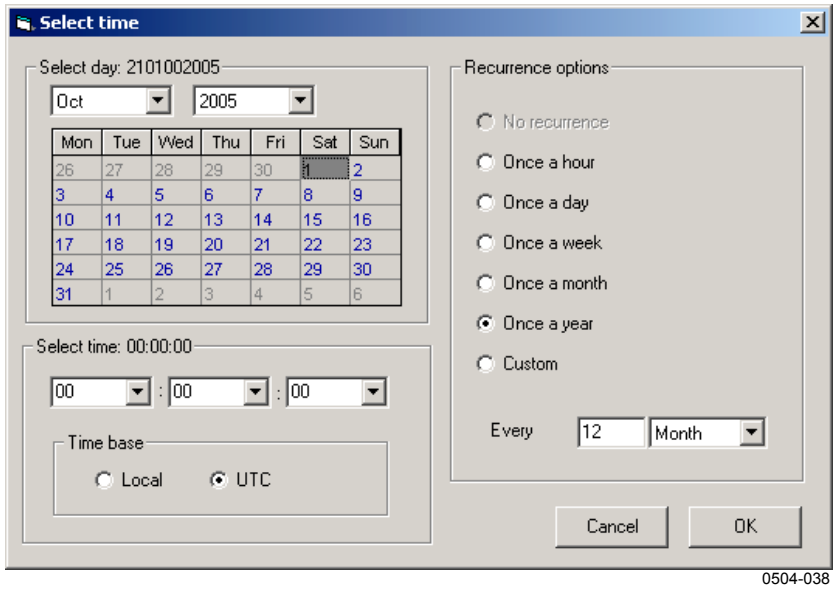


Figure 18 Select Time View: Selecting Accumulator Resetting Schedule

If you select reset to occur once an hour, the timing is as with normal timers.

If you select reset to occur monthly and the resetting date is the last day of the month, reset always occurs during the very last day regardless of the number of days in that particular month. For example, for February and leap year, the system automatically reschedules the resetting days 30 and 31 to be the 28th or the 29th, depending on the year.

In the example above, reset occurs once a year in the 1st of October at midnight.

Resetting Accumulator Manually

You can also reset the Accumulator manually, that is, assign a positive initial value of zero or greater than zero to the accumulation. In order to reset the Accumulator when using MAWS Terminal, proceed as follows:

1. Start MAWS Terminal and select the **Station Settings** option from the **Tools** menu or click on the **Set Station Settings** icon in the **Toolbar**, see Figure 19 below.
2. In the **Static Parameters** tab of the **MAWS Station Settings** window, double-click the corresponding **Value** cell.

   The parameter is the one that was selected from the **Select static parameter** combo box or entered manually in the text box in the **Configure** frame of the **Calculations** view at the time the Accumulator was configured.

   Enter the new parameter value and press **Enter**. Typically the value is 0.0 but any number greater than zero can be used.

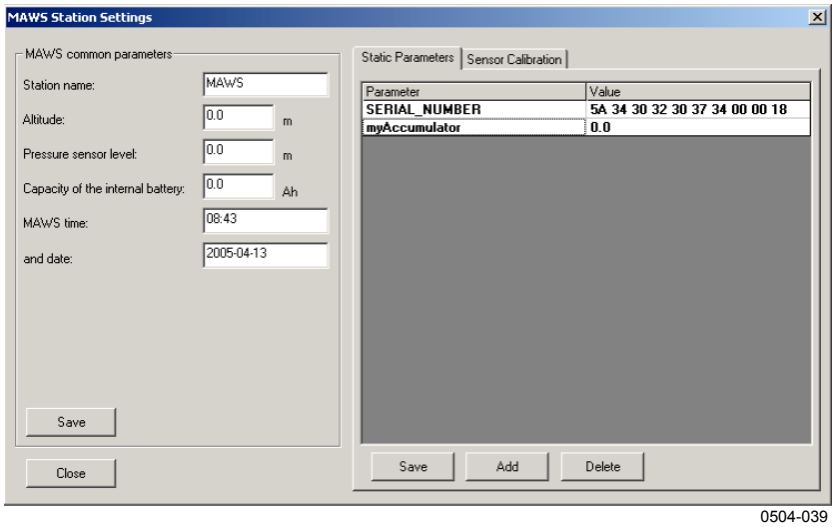


Figure 19 MAWS Station Settings Window: Entering Accumulator Reset Value Manually

3. Click **Save** to store the new parameter value to MAWS.

If you use some other terminal program than MAWS Terminal in order to reset the Accumulator, give the following command:

SPSET <*static parameter*> [*initial value*]

where

static parameter	=	Name of the static parameter, selected from the **Select static parameter** combo box or entered manually in the text box in the **Configure** frame of the **Calculations** view.
initial value	=	The initial value you wish to assign for the accumulation. Always enter the value with one decimal place (for example, 0.0).

Using the Accumulator Variable in Reports

To use the Accumulator variable, proceed as follows:

1. Select the **Reports** view.
2. Create a new report or select an existing one to include the Accumulator variables for the Accumulator.
3. Lizard displays the items that are available for the source in question in the **Available** list box in the **Select Variables** frame.

   Note that the variable used in accumulation is located under the source name *SParServer*. Click on the plus sign in the **Select Variables** list box to display it.

Power Control Option

Power Control is used to control the physical output: either the output pin on the extension board (for example QMI108) or an excitation output on the logger.

With this option, it is possible to use the same output for several purposes so that the output pin will be active as long as there is one reservation left. For example, several sensors can use common powering without extremely careful synchronization of timing.

The Power Control option is located in the **Misc** list in the **Select Calculation** frame. For a variety of options, see also the **Conv** list.

Configuring Power Control Option

To configure the Power Control option, proceed as follows:

1. Start MAWS Lizard.
2. Open an existing setup in the **Setup** view or create a new one.
3. Proceed to the **Calculations** view to configure Power Control, see Figure 20 below.
4. Click **Misc** to list the available options.
5. Select *PowerCTRL* from the **Available** list and click **Add**.
8. Select the output to be controlled from the **Channel** list in the **Configuration** frame.

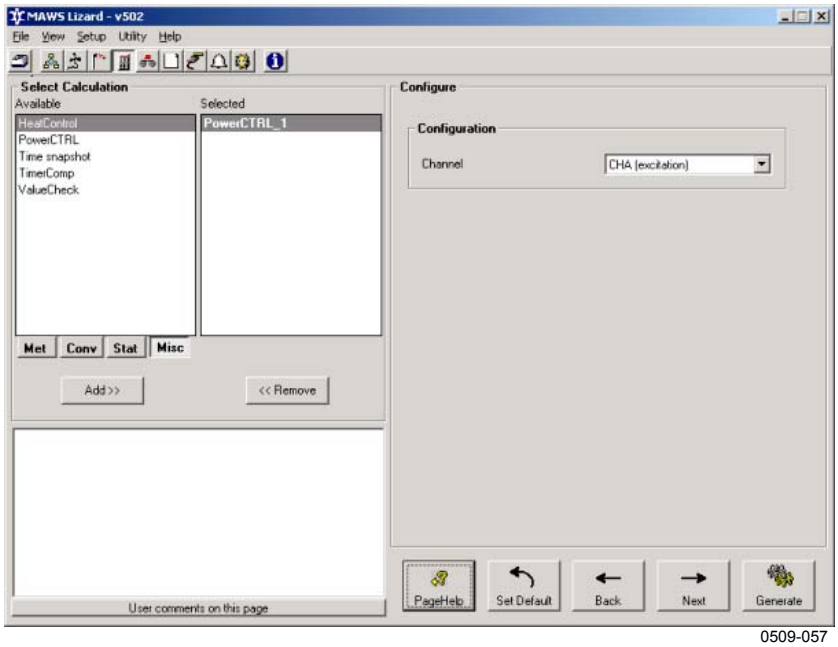


Figure 20 Calculations View: Configuring Power Control

Timer Option

Timer is used to create timed events that occur at a predefined time at specific intervals. These events resemble the timers in the **Timers** view but are more freely configurable to meet specific needs.

The Timer option is located in the **Misc** list in the **Select Calculation** frame. For a variety of options, see also the **Conv** list.

Configuring Timer Option

To configure the Timer option, proceed as follows:

1. Start MAWS Lizard.
2. Open an existing setup in the **Setup** view or create a new one.
3. Proceed to the **Calculations** view to configure Timer, see Figure 21 below.
4. Click **Misc** to list the available options.

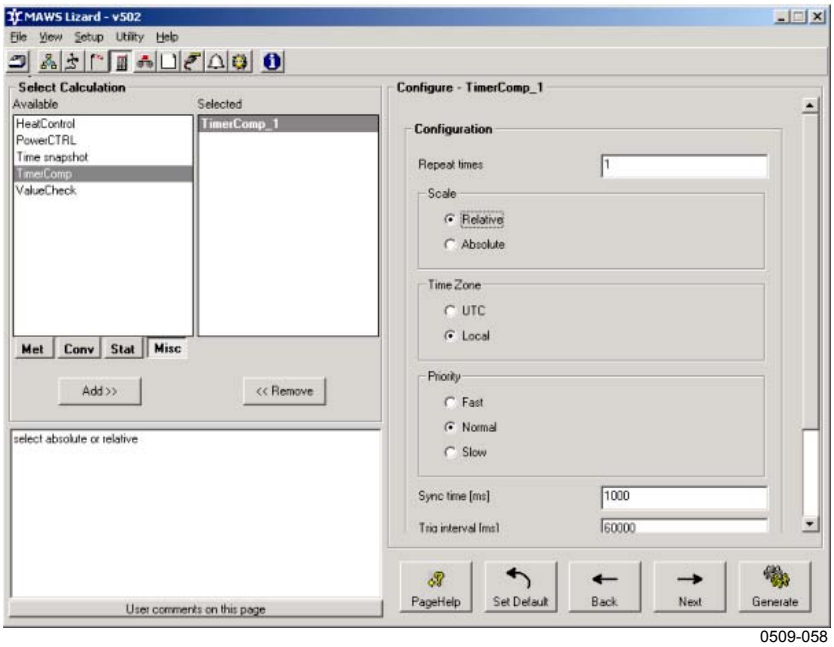


Figure 21 Calculations View: Configuring Timer

5. Select *TimerComp* from the **Available** list and click **Add**.

There are several configuration options in the **Configuration** frame on the right:

Option	Description
Repeat times	Defines how many timed events will be created
Scale	Indicates whether the timed events are tied to absolute time or whether they are relative and only the interval is meaningful
Time Zone	Specifies whether UTC or local time is used to calculate the timed events, if the scale selected is **Absolute**
Priority	Defines the priority of the timer. Typically, **Normal** or **Slow** are the most suitable options. A **Fast** timer should be used only in time-critical actions.
Sync time [ms]	defines the moment that the timed events are tied to (as in Timers view).
Trig interval time [ms]	Specifies the interval between timed events (as in **Timers** view).

Enhanced Time Snapshot

In MAWS Lizard version 5.02 or higher, the Time Snap option is capable of returning also UNIX time, if requested.

You can use the UNIX time option in MAWS Lizard by selecting it from the **Available** list under **Select Variables** in the **Reports** view, see Figure 22 on page 45.

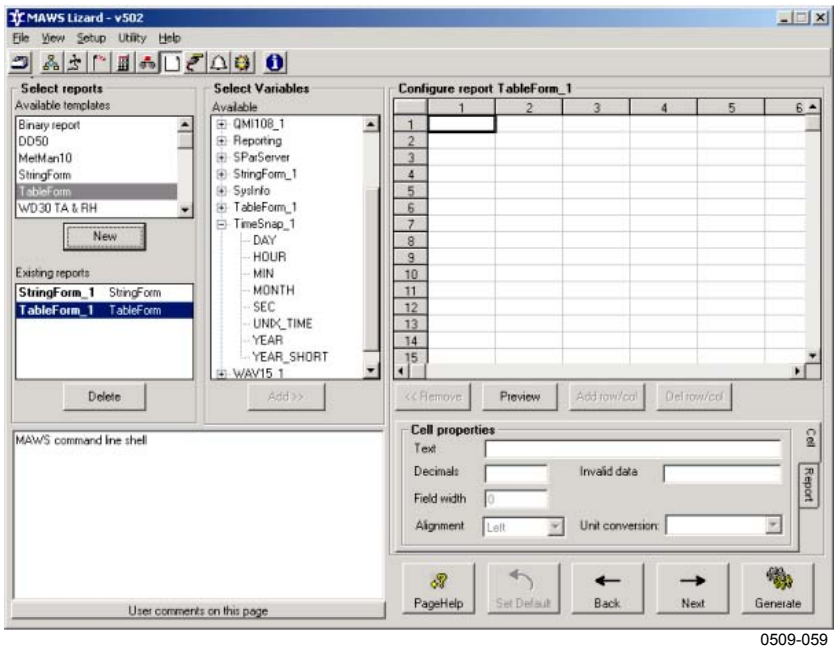


Figure 22 Reports View: UNIX Time Option under Time Snap

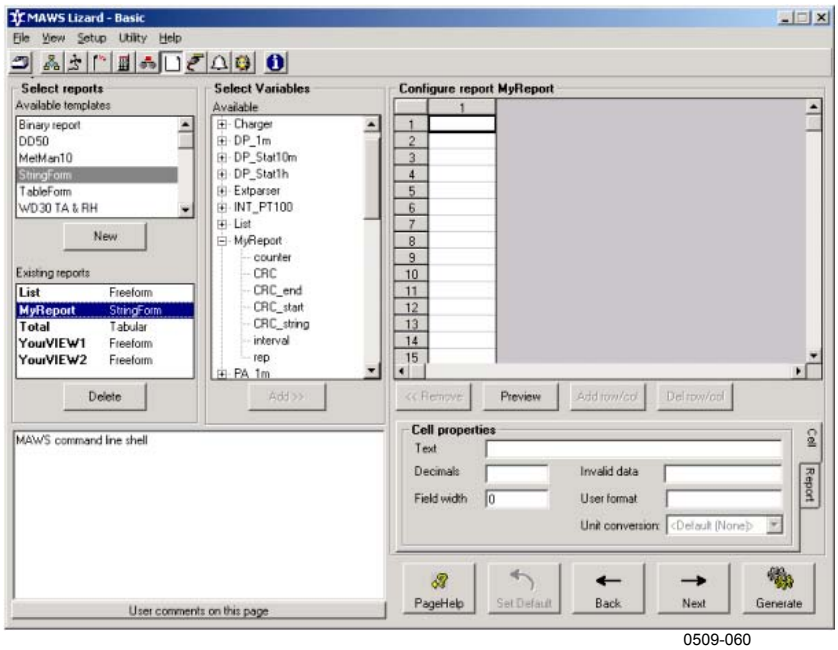
Checksum Option in Reports

With the MAWS software version 5.02 or higher, it is possible to add a checksum into the report that is already in the report configuration. You can also define where the data begins and ends in the checksum calculation as well as format the checksum fields to meet your own requirements.

Creating Checksum Report

To use the checksum option in a report, proceed as follows:

1. Start MAWS Lizard.
2. Open an existing setup in the **Setup** view or create a new one.
3. Proceed to the **Reports** view to configure a checksum report.
4. Open the available variables in the **Select Variables** frame. The configurable report in this example is *MyReport*, see Figure 23 on page 46.



0509-060

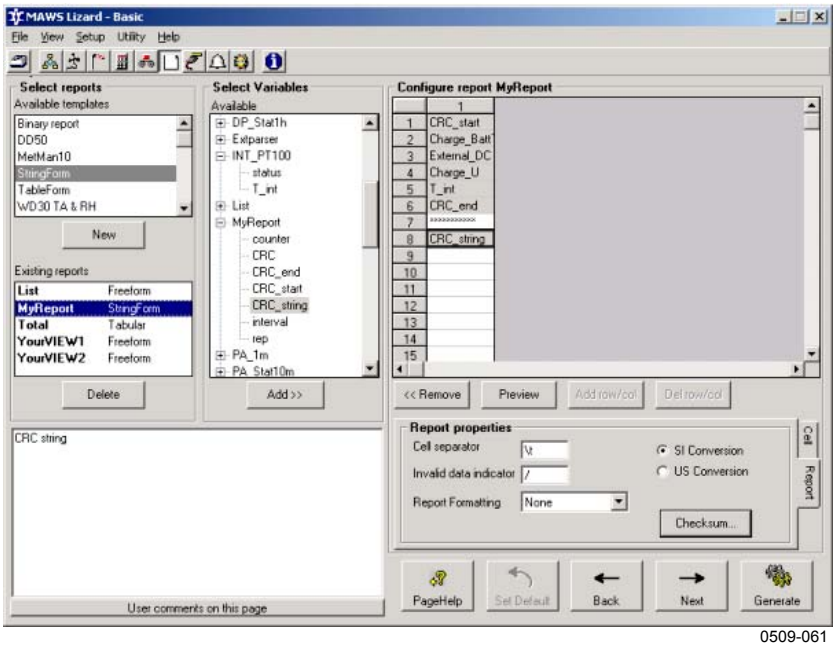
Figure 23 Reports View: Configuring New Checksum Report

There are new variables in the list that are used for calculating and showing the checksum:

- **CRC** returns the checksum to be formatted in a User format
- **CRC_start** indicates the start of data to be included in the CRC
- **CRC_end** stops calculating the CRC
- **CRC_string** returns the checksum in an ASCII presentation

To calculate a CRC, proceed as follows. Note that this procedure is an example of a typical case.

1. Go to the **Reports** view, see Figure 24 below:



0509-061

Figure 24 Reports View: Adding CRC

The variables from rows 2 to 6 are taken into account when calculating the CRC.

The CRC is placed after the ******* string.

2. For the CRC calculation method, see the **Report properties** frame.
   - Select the **Report** tab on the right and click the **Checksum** button. The following **Checksum settings** window opens, see Figure 25 on page 48.

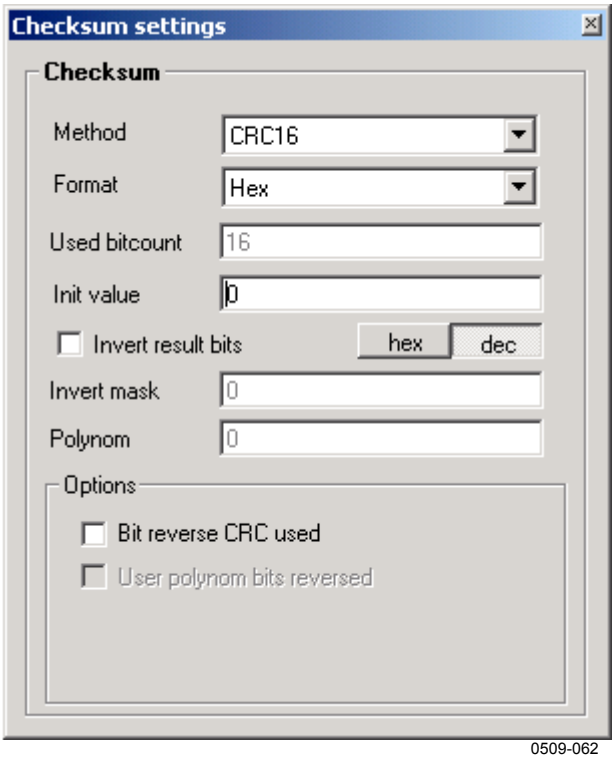


Figure 25 Checksum Settings Window

In the **Checksum settings** window you can define the following parameters:

- **Method**

Parameter Option	Description
SUM	Calculates a sum from the bytes to be included in CRC
XOR	Calculates an exclusive OR from the bytes to be included in CRC
CRC16	16-bit CRC
CRC32	32-bit CRC
USER CRC	User-defined CRC

- **Format**

Parameter Option	Description
Hex	Displays the CRC in a hexadecimal format
Hex LSB first	Displays the CRC in a hexadecimal format, Lower byte first
KERMIT	Kermit-style formatting
WXT	Vaisala Weather Transmitter style formatting

- **Used bitcount**, specifies how many bits are used to calculate the CRC. 16 bits is typical for SUM and CRC16, 8 bits is typical for XOR.
- **Init value**, indicates the start value for the CRC, that is, where the calculation is started. This parameter is also known as a seed.
- **Invert results bit**, can be used for bit inversion in the final CRC
- **Invert mask**, an informative field
- **Options**

Parameter Option	Description
Bit reverse CRC used	CRC is displayed in a reversed order, the lowest bit is exchanged with the highest bit and so on
User polynom bits reversed	Only available with USER CRC. The lowest bit is exchanged with the highest bit and so on.

Binary Report

With the MAWS software version 5.02 or higher, it is also possible to create binary reports, that is, reports where data is stored as binary instead of visible ASCII characters. It is also possible to pack data so that one data item uses only a limited number of bits.

Creating Binary Report

To configure a binary report, proceed as follows:

1. Start MAWS Lizard.
2. Open an existing setup in the **Setup** view or create a new one.
3. Proceed to the **Reports** view to configure a binary report.
4. Select *Binary report* from the **Available templates** list and click **New** to create a new report, see Figure 26 on page 50.

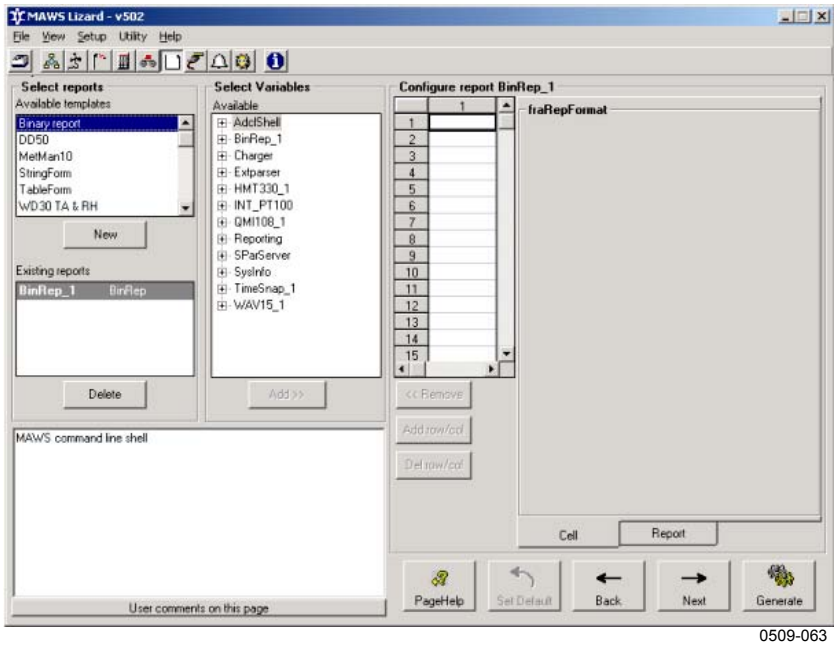
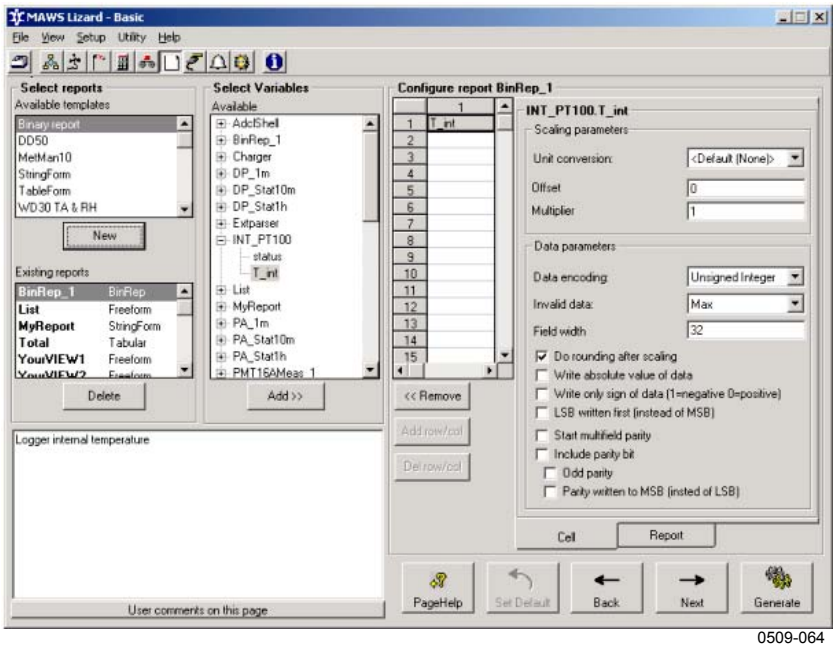


Figure 26 Reports View: Selecting Binary Report Form

A binary report is configured like any other report.

Binary reports differ from regular ones in the formatting of the data items. Each time a new item is added to a report, a formatting frame appears, see Figure 27 on page 51.



0509-064

Figure 27 Reports View: Binary Report Formatting Frame (1/2)

Scaling parameters define how the data item will be scaled into the binary report:

- **Unit conversion**, specifies whether the value will be converted to other units, for example from Celsius degrees to Kelvin. This parameter functions in the same way as in a regular report.

- **Offset** option, indicates whether some offset value is added to the value (after a possible conversion).

- **Multiplier** option, indicates whether the value is multiplied (after a possible conversion).

  If scaling is used, the following formula applies:
  New value = (value + Offset)·Multiplier

Data parameters define how the data value is coded in the binary report, for example how many bits are used:

- **Data encoding**, specifies the type of the value. The parameter options are the following:

Parameter Option	Description
Unsigned integer	Presents the value as a positive integer number

Parameter Option	Description
Integer	Presents the value both as a negative and a positive integer value
Float	Presents the value as a floating point number using 4 bytes: sign bit, 8-bit exponent, 23-bit mantissa
Double	Presents the value as a floating point number using 8 bytes: sign bit, 11-bit exponent, 52-bit mantissa
BCD	Presents the value as a binary code decimal

- **Invalid data**, used to indicate which value will be presented in the data field when the source parameter is invalid. The parameter options are the following:

Parameter Option	Description
Ignore	encodes the invalid input value as it is
Zero	Used as an invalid value
Min	specifies the lowest value in the encoding range as the invalid value
Max	specifies the highest value in the encoding range as the encodable value

- **Field width**, defines how many bits are used to encode the value. It is possible to use less bits than the data encoding value would require. For example, if 11 bits are used for an integer, only those 11 bits are stored in the binary report.

- **Do rounding after scaling**, indicates that the value is rounded to the nearest integer (after unit conversion and scaling).

- **Write absolute value of data**, indicates that negative values are multiplied by -1.

- **Write only sign of data**, indicates that only a polarity bit is displayed for data item. The polarity bit is zero if the data item is equal to or more than zero (positive value of the data item). Otherwise the polarity bit is one (negative value of the data item).

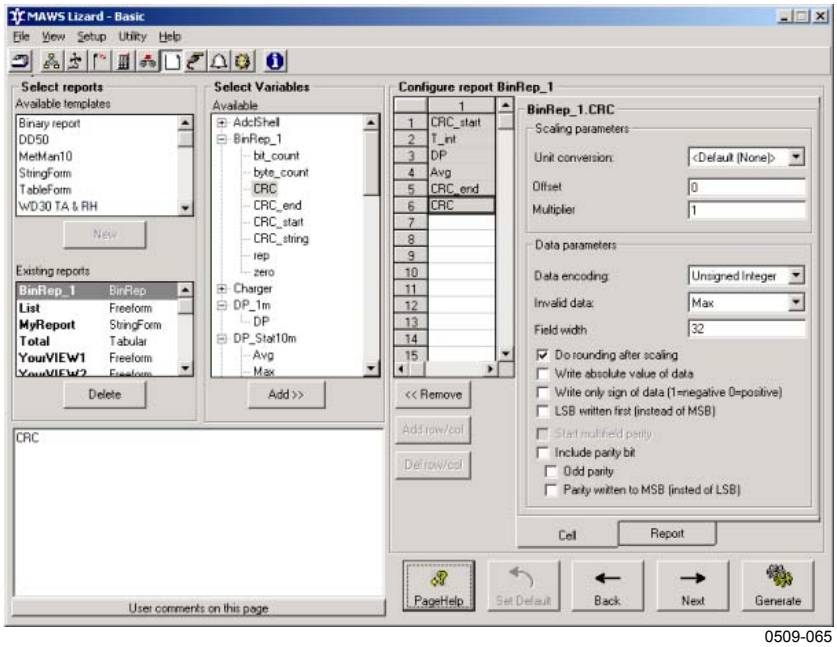
- **LSB written first**, indicates that the number is displayed in a reversed order (INTEL presentation).

- **Include parity bit**, indicates that a parity bit is added to this field to assure data validy. This option increases field length by one. See below for a description of the parameter options:

Parameter Option	Description
Odd parity	If selected, odd parity is used; otherwise even parity
Parity bit is written to MSB	Indicates that the parity bit is the most significant bit; otherwise the least significant

For information on how to add a checksum, see section Checksum Option in Reports on page 45. In binary reports, the CRC option should be used instead of CRC_string.

There are also parameters that you can retrieve from the binary report component in the **Select Variables** frame, see Figure 28 below.



0509-065

Figure 28 Reports View: Binary Report Formatting Frame (2/2)

- **Bit count**, indicates how many bits are included in this report

- **Byte count**, indicates how many bytes are included in this report

- **Zero**, return number zero. This parameter can be used to add a constant into the binary report. Offset and multiplier are used to set a constant using the following formula:

  constant = (Zero+Offset)·Multiplier(=1)

CHAPTER 6

CONFIGURING SENSORS

This chapter provides advanced information on configuration and measurement control for different sensors.

For basic information on MAWS setups, refer to MAWS Lizard Setup Software User's Guide.

Vaisala Weather Transmitter

Vaisala Weather Transmitter WXT510 is an integrated weather instrument that measures the following variables:

- Wind speed and direction
- Air temperature
- Relative humidity
- Precipitation
- Air pressure

WXT510 to be used with MAWS has the following default configuration:

Checksum	ON
Automatic precipitation reset	ON
Mode	Autosend
Precipitation message	Time-based

For more detailed information on the measured parameters, see Weather Transmitter WXT510 User´s Guide.

Configuring Vaisala Weather Transmitter WXT510

Communications Setup

Vaisala Weather Transmitter WXT510 is connected to MAWS through a RS-485 or RS-232 serial line. There are three alternative ways to connect the WXT510 sensor to MAWS:

1. RS-232 autosend mode where WXT510 automatically sends measurement data to MAWS. Only one WXT510 per a serial line is allowed.
2. RS 485 polled 2-wire connection. Several WXT510 sensor connections are allowed on the same serial line.
3. RS-422 4-wire autosend.

The default data transmission parameters are the following: *9600 bps, 8 data bits, no parity, 1 stop bit*.

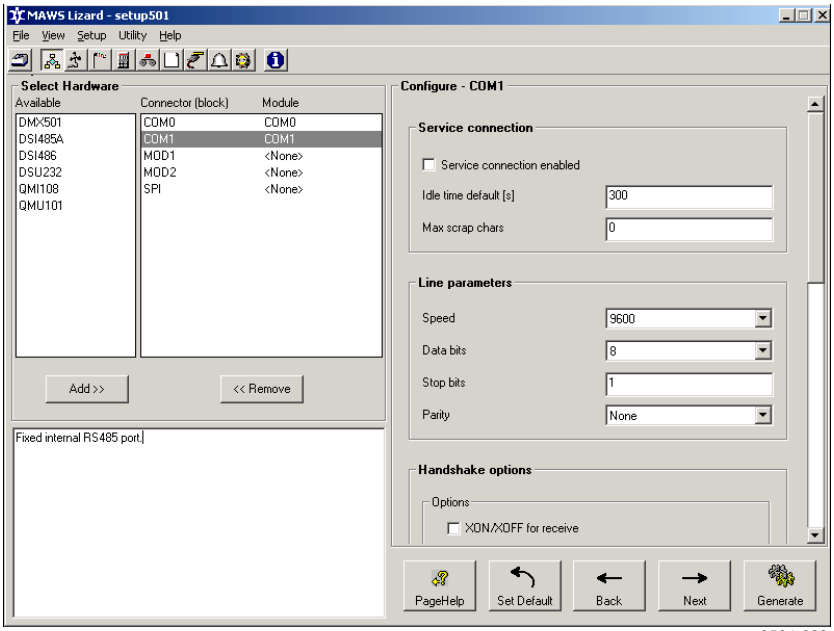
For more information on wiring of the RS-485 and RS-232 options, see the MAWS301 Installation Manual. For more information on configuring serial ports, see MAWS Lizard Setup Software User's Guide.

Configuring the Sensor

There is a standard order code for Vaisala Weather Transmitter WXT510 in the applications with the MAWS system.

However, if you need to check/modify the configuration, proceed as follows. WXT510 is configured using MAWS Lizard.

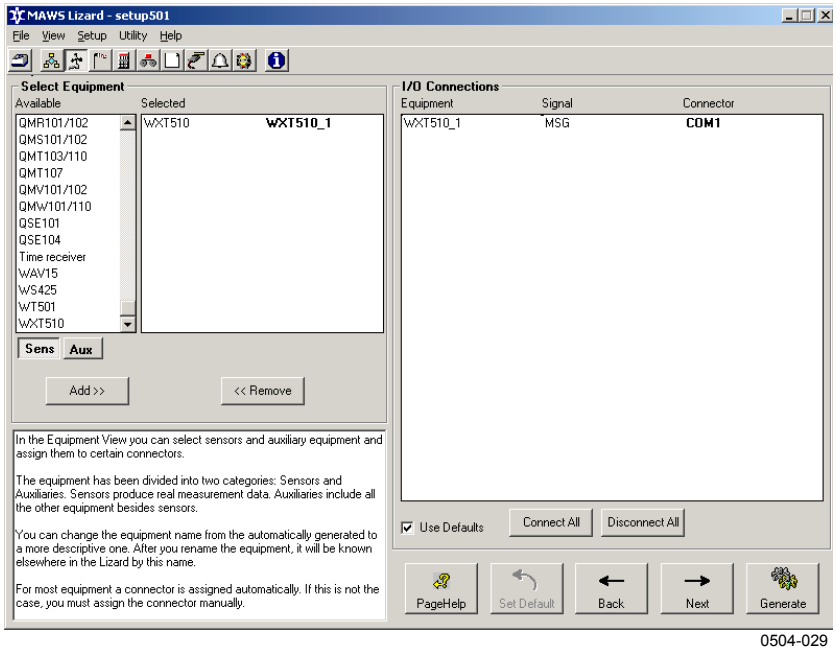
1. Start MAWS Lizard. For example, click on the **Start** button and select **Programs**, **Vaisala** and **MAWS Lizard**.
2. Open an existing setup in the **Setup** view or create a new one.
3. Proceed to the **Hardware** view by clicking **Next** to configure the WXT510 sensor hardware, see Figure 29 below.
   - In this example, COM1 has been selected for use with the WXT510 sensor.
   - You are recommended to keep the default settings in the **Line parameters** frame.



0504-028

Figure 29 Hardware View: Configuring WXT510

4. Proceed to the **Equipment** view by clicking **Next**, see Figure 30 below.
   - Scroll down the **Available** list box for WXT510.
   - Click on the **Add** button to select WXT510.
   - Double-click the **Connector** list for WXT510 in the **I/O Connections** frame in order to select the COM port.



0504-029

Figure 30 Equipment View: Selecting the I/O Connection for WXT510

5. Proceed to the **Measurements** view by clicking **Next**, see Figure 31 on page 59.

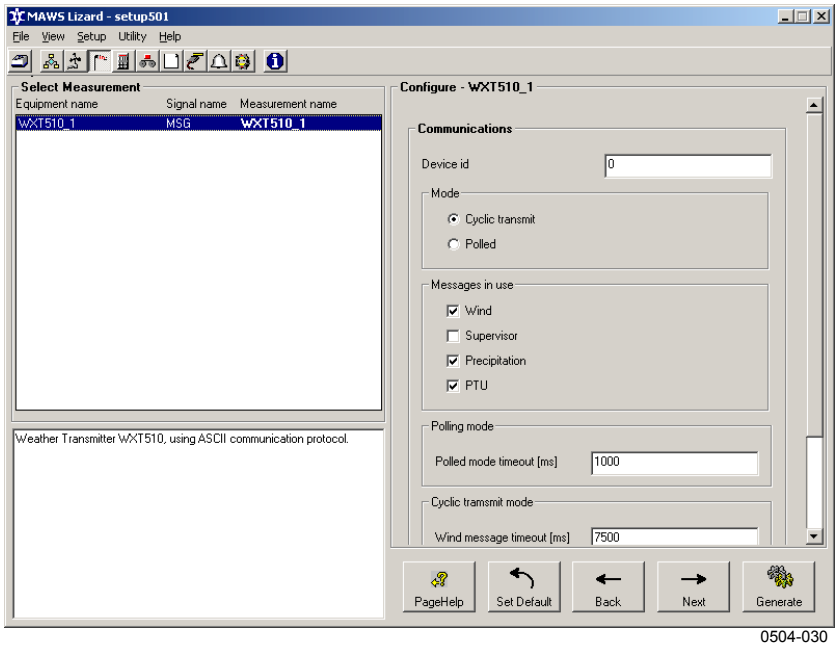


Figure 31 Measurements View: Configuring WXT510 Communications Options

There are several parameter options you can set in the **Communications** frame of the **Measurements** view. Note that in general, the predefined settings are the most suitable for a typical MAWS setup.

In order to change a parameter option, you simply need to select or unselect the corresponding check box. The options you select must be enabled in the connected WXT510.

The following options are available:

Use the **Device ID** editable text box to distinguish WXT510. For information on how to change the device ID, see Weather Transmitter WXT510 Users' Guide.

You can select the **Mode** in which WXT510 is operated. When you select the **Cyclic transmit** mode, WXT510 automatically sends data at predefined intervals. This mode can be used if only one WXT510 is connected to the same serial line (only one device per serial port is allowed). If you select the **Polled** mode, MAWS polls WXT510 at predefined intervals to retrieve data. Several devices can be connected to the same serial line.

Select also the **Messages in use**:

- Wind: wind speed and direction are received
- Supervisor: internal data is received from WXT510
- Precipitation: the amount, duration and intensity of rain and hail are received
- PTU: air pressure, temperature and humidity are received

Note that the options you select must be enabled in the connected WXT510.

Furthermore, you can select the communication timeout in **Polling mode** and in the **Cyclic Transmit mode**, see Figure 32 below:

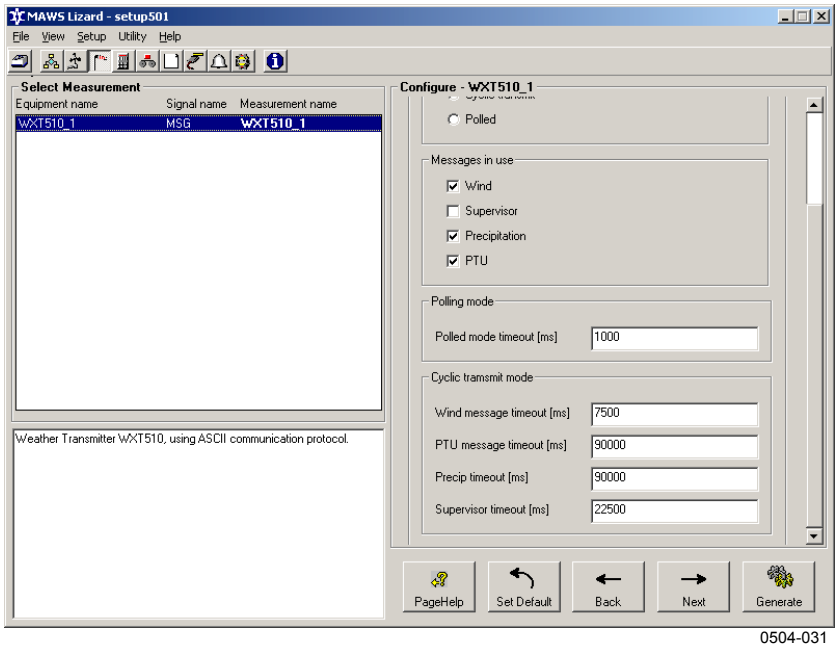


Figure 32 **Measurements View: Configuring WXT510 Timeout Parameters**

With the **Polled mode timeout** parameter you can define the maximum length of time allowed for WXT510 to reply.

With the communication timeout parameters in **Cyclic transmit mode**, you can define a maximum interval between two messages. If the new message from WXT510 has not been received within the given time, the data in that message is then marked as invalid.

Using Sensor Variables in Reports

You can use the variables received from the Weather Transmitter WXT510 in MAWS Lizard like those from any other sensor.

To check which variables are available, proceed as follows:

1. Select the **Reports** view, see Figure 33 on page 62.
2. Create a new report or select an existing one to include the variables for WXT510.
3. Click **WXT510_1** in the **Available** list box in the **Select Variables** frame.
4. Lizard displays the items that are available for the source in question. The items are grouped under source names like files in directories. To see the list of items under a source, click on the plus (+) sign. To collapse the list, click on the minus (-) sign. For more information on these variables, see Weather Transmitter WXT510 User's Guide. When you click on an item in the **Select Variables** list box, a brief description also appears in the information pane on the lower left.

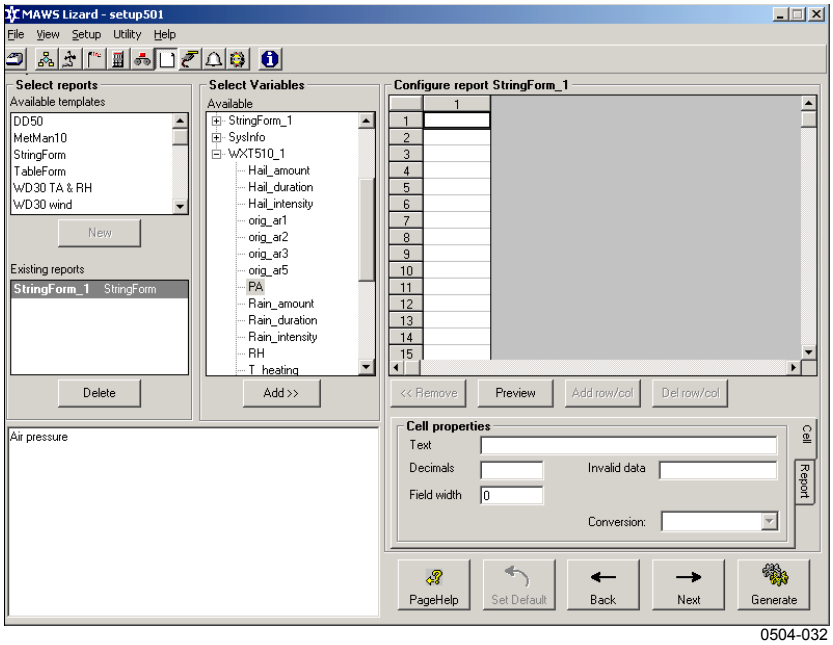


Figure 33 Reports View: Checking WXT510 Variables

Gill's WindSonic

To configure Gill's WindSonic, proceed as follows:

In the **Equipment** view, select *WindSonic* from the sensor list and connect it to the selected serial port. After that, the sensor is ready for use.

NOTE	The WindSonic transmits data continuously, 4 times per second. Therefore it reserves the serial line completely, and the same line cannot be used for other sensors.

For more information, refer to the Gill WindSonic user's guide.

METEK's 3D Ultrasonic Anemometer

The Ultrasonic Anemometer, model USA-1, is an ultrasonic wind sensor manufactured by Meteorologische Messtechnik (METEK) GmbH. The sensor measures wind speed and wind direction, or alternatively the three orthogonal wind components **x**, **y**, and **z**.

There are several serial output settings available for this sensor. MAWS implementation is based on a standard version and MAWS can receive the following message formats:

M:x = 10 y = -3 z = -1 t = 2203

H:x = 10 y = -3 z = -1 t = 2203

D:x = 10 y = -3 z = -1 t = 2203

The first character of the message indicates the heating status of the sensor:

M = Heating is OFF
H = Heating is ON
D = Heating should be on ON, but there is a defect

Heating is controlled by the USA-1 sensor and is based on user configurable settings.

The message also includes the wind components **x**, **y** and **z** as well as a temperature component **t**. The unit of the wind components is *cm/s* and the unit of the temperature component is *Celsius degrees* with two decimals.

The example message above is thus interpreted as follows:

x = 10	The x component of wind is 10 cm/s
y = -3	The y component of wind is -3 cm/s
z = -1	The z component of wind is -1 cm/s
t = 2203	The temperature is 22.03 Celsius degrees

NOTE Note that the unit for wind speed is cm/s in the message received from USA-1. MAWS will automatically convert the unit to m/s which is the standard unit for measuring wind speed.

The output frequency must be at least one message per second. A typical setting is ten messages per second.

For more detailed information on how to set the parameters for the USA-1 sensor, refer to METEK's user guides.

Configuring Ultrasonic Anemometer USA-1

Communications Setup

The USA-1 wind sensor is connected to MAWS through a RS-422 or RS-232 serial line. Follow METEK's instructions when selecting cabling for the desired mode.

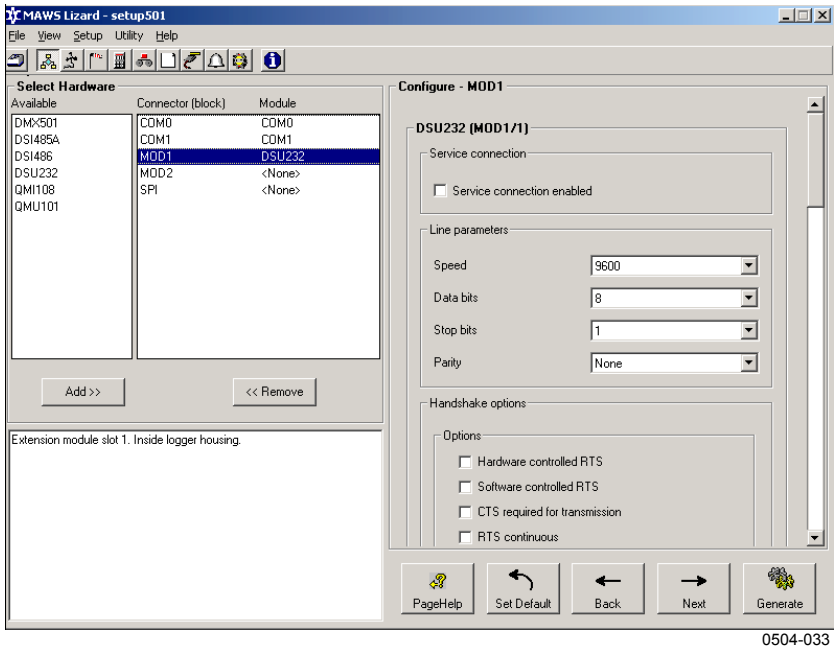
The default data transmission parameters for USA-1 are the following: *9600 bps, 8 data bits, no parity, 1 stop bit*.

For more information on wiring of the RS-485 and RS-232 options, see Automatic Weather Station MAWS301 Installation Manual. For more information on configuring serial ports, see MAWS Lizard Setup Software User's Guide.

Configuring the Sensor

USA-1 is configured using MAWS Lizard. Proceed as follows:

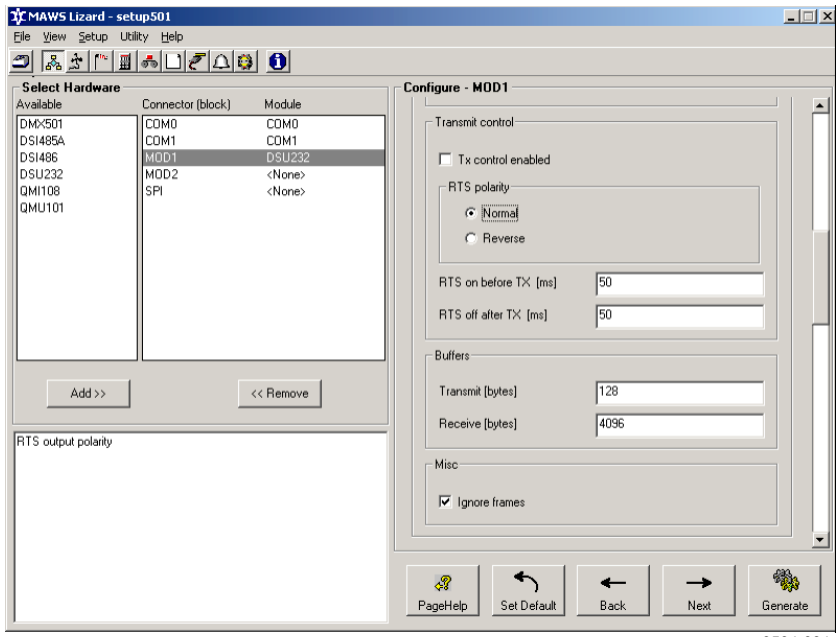
1. Start MAWS Lizard. For example, click on the **Start** button and select **Programs**, **Vaisala** and **MAWS Lizard**.
2. Open an existing setup in the **Setup** view or create a new one.
3. Proceed to the **Hardware** view by clicking **Next** to configure the USA-1 sensor hardware, see Figure 34 on page 65.
   - In this example, DSU232 has been selected for use with the USA-1 sensor (having an RS-232 interface).
   - You are recommended to keep the default settings in the **Line parameters** frame.



0504-033

Figure 34 Hardware View: Configuring USA-1

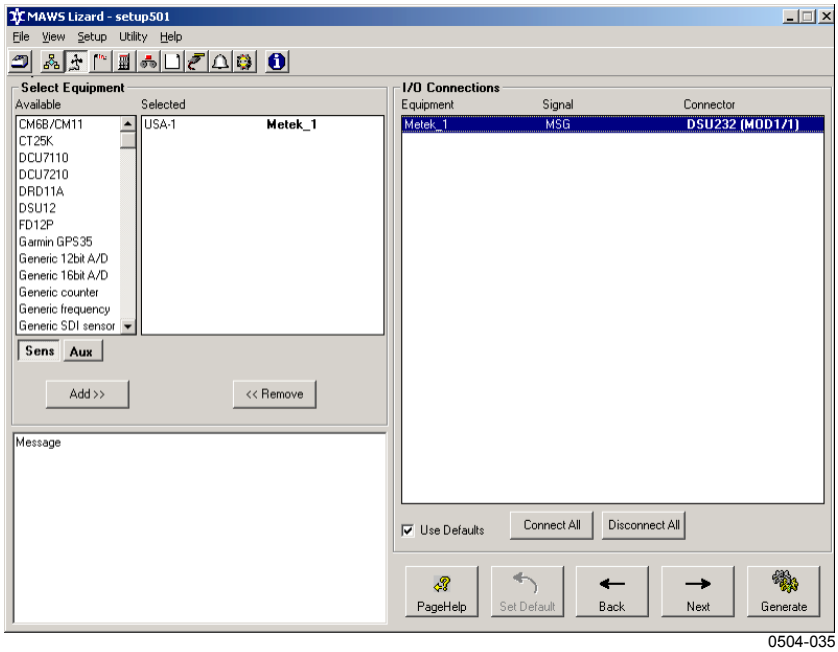
4. Scroll down the **Configure** frame until the following options are displayed, see Figure 35 below.



0504-034

Figure 35 Hardware View: Selecting Configuration Options for USA-1

5. Select the **Ignore frames** check box in the **Misc** frame. This option disables handling of messages received from USA-1 during startup and thus prevents receive overflow.
6. Proceed to the **Equipment** view by clicking **Next**, see Figure 36 below.
   - Scroll down the **Available** list box for USA-1.
   - Click on the **Add** button to select USA-1.
   - Double-click the **Connector** list for USA-1 in the **I/O Connections** frame in order to select the COM port.



0504-035

Figure 36 Equipment View: Selecting the I/O Connection for USA-1

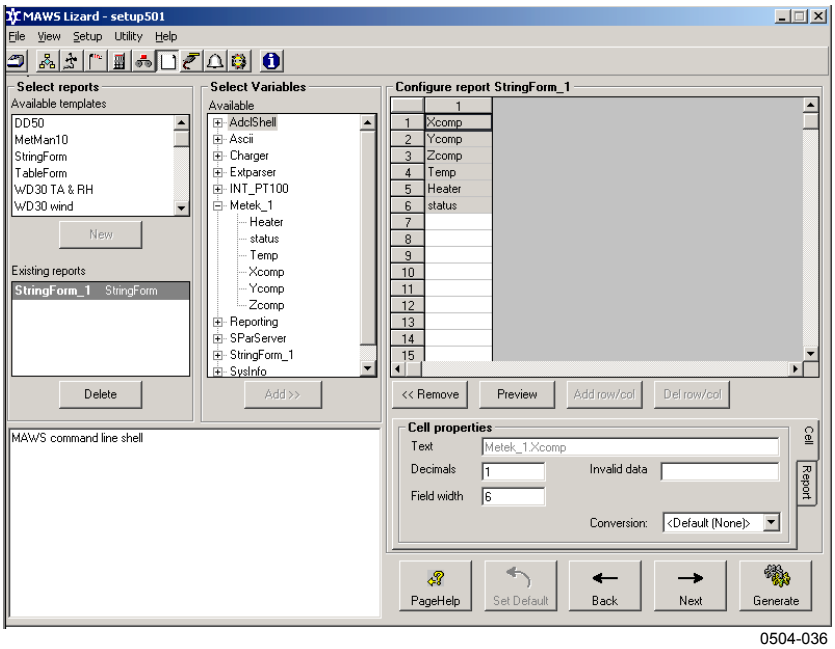
Using Sensor Variables in Reports

You can use the variables received from USA-1 in MAWS Lizard like those from any other sensor.

To check which variables are available, proceed as follows:

1. Select the **Reports** view, see Figure 37 on page 67.
2. Create a new report or select an existing one to include the variables for USA-1 (Metek_1).

3. Click **Metek_1** in the **Available** list box in the **Select Variables** frame.
4. Lizard displays the items that are available for the source in question. The items are grouped under source names like files in directories. To see the list of items under a source, click on the plus (+) sign. When you click on an item in the **Select Variables** list box, a brief description also appears in the information pane on the lower left.



0504-036

Figure 37 Reports View: Checking USA-1 Variables

The available variables are as follows:

1. Heater, indicates the status of heating in USA-1 (Metek_1):

   0 = Heating is ON
   1 = Heating is OFF
   2 = Heating defect
   3 = Heating status unknown
   (for example, no message received from USA-1)

2. Status, indicates the internal status of the MAWS interface for USA-1, and the possible values. See below for value descriptions:

Value	Description
0	The sensor is working properly (OK)
1	Not measured yet
2	Interface not initialized (no message received after startup)
3	Communication timeout
4	Unknown data received
6	Sensor communication paused because pass-through service connection opened using MAWS (or no message received after startup when **Ignore frames** option is selected)
30	Measurement/sensor has been manually disabled

3. Temp, temperature in Celsius degrees
4. Xcomp, x-component of **wind in unit of m/s**
5. Ycomp, y-component of **wind in unit of m/s**
6. Zcomp, z-component of **wind in unit of m/s**

Vaisala Wind Vane

Installing Wind Vane WAV151

Note that before you can install the mechanical Vaisala Wind Vane WAV151, you have to install the Digital I/O Module QMI108 and connect it to the logger.

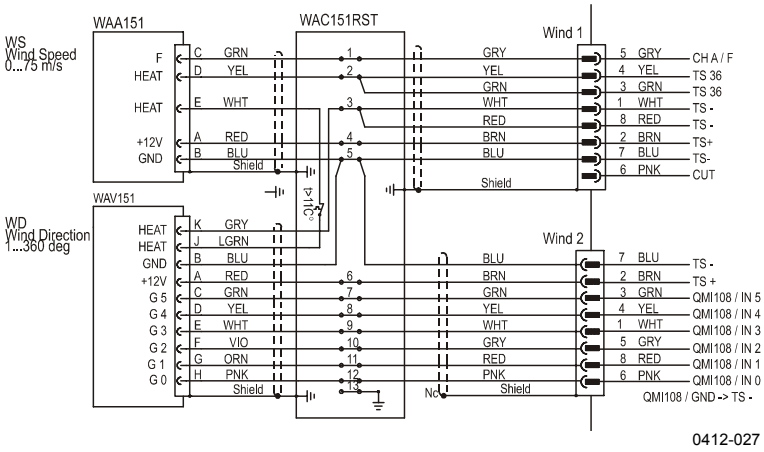


Figure 38 Wiring Diagram for QMI108 with WAA151 and WAV151 - Sensors Powered Continuously

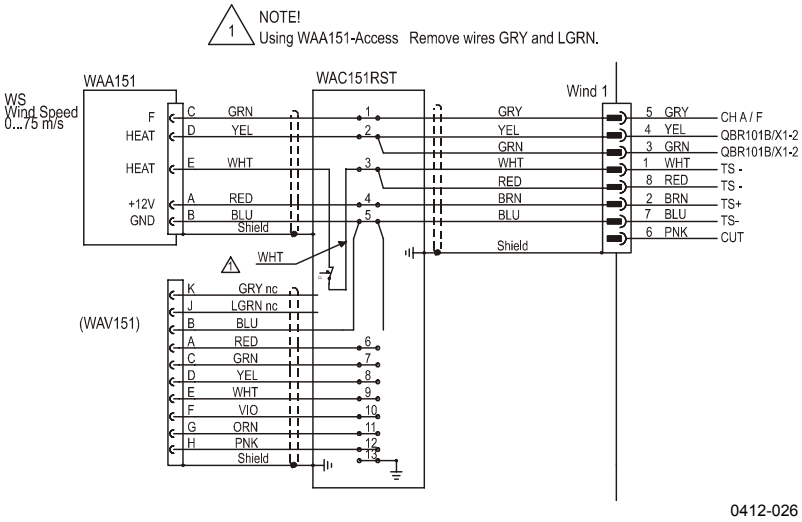


Figure 39 Wiring Diagram for QMI108 with WAA151 Only

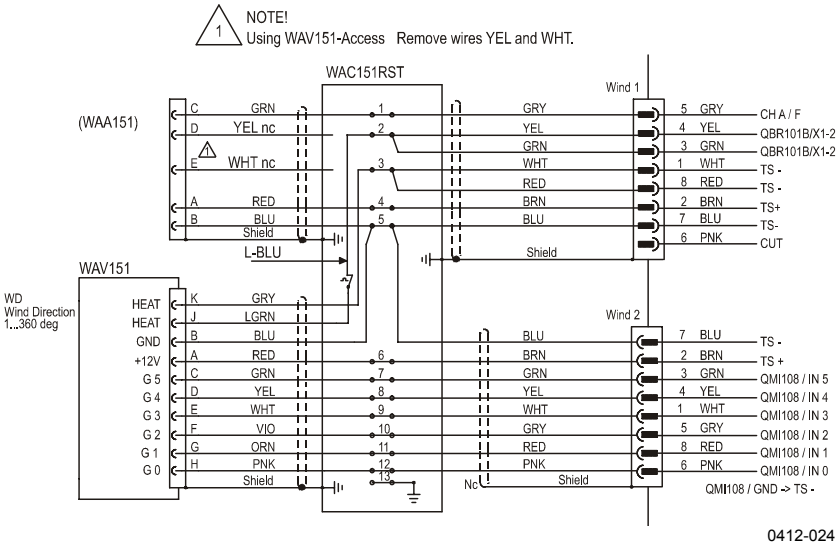


Figure 40 Wiring Diagram for QMI108 with WAV151 Only

The wind vane is added to the setup in the **Equipment** view. Simply select WAV151 from the sensor list. There is no need for other connections because WAV151 is always connected to the QMI108 unit.

Typically, WAV151 is continuously powered from an external 12 VDC power source. In this default mode, there is no need to set or change any default parameters.

However, in low-power systems some power reduction can be implemented. In such case, you can select the **When measuring** option in the **Sensor power on** frame of the **Measurements** view, see Figure 41 on page 71.

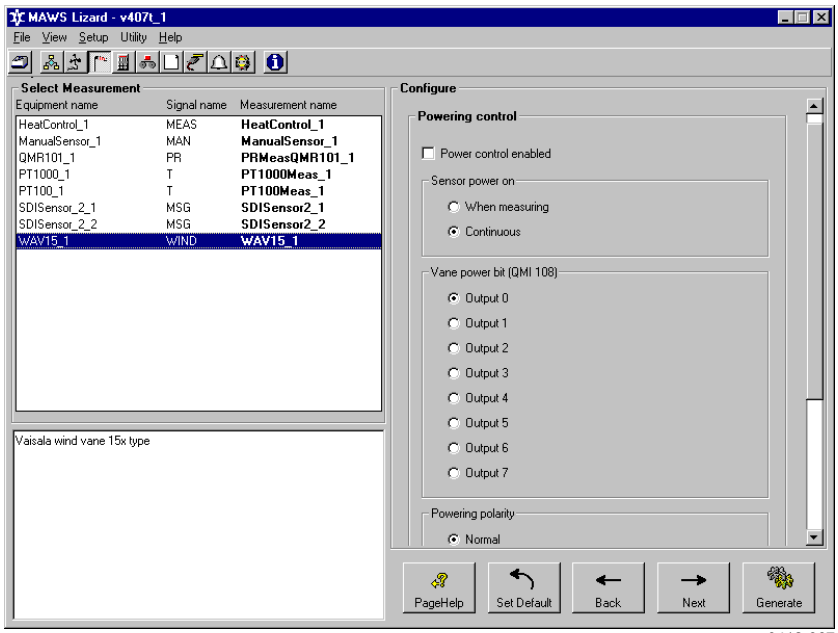


Figure 41 Measurements View: Configuring Powering Control

For the wiring diagram, see Figure 42 below.

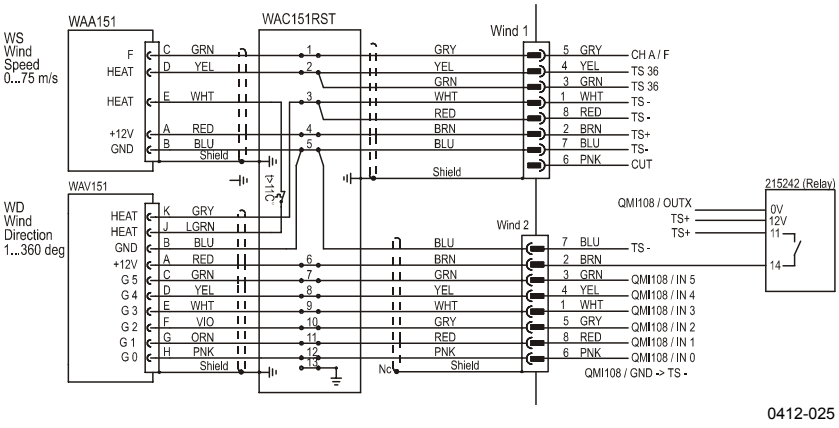


Figure 42 Wiring Diagram for QMI108 with WAA151 and Power Reduction for WAV151 - WAV151 Powered only when Measured

If you select the **Power control enabled** option, you can choose the following:

- In the **Sensor power on** frame: Powering of the wind vane, either continuous or during measurement only
- In the **Vane power bit** frame: The output pin of QMI108 to be used to control sensor excitation in the **When measuring** mode

- In the **Powering polarity** frame: The QMI108 output, which is typically normal but can be reversed. This depends on the hardware used to control powering.
- The **Pre-measure delay** field: The delay between power on and measurement start [ms]. This option provides stabilization time for sensor before measurement is made. The value should never be less than 60 milliseconds.

Vaisala HUMICAP® Humidity and Temperature Transmitters HMT330 Series

The HMT330 series is a transmitter product family designed for different environments. From the MAWS viewpoint, all versions look identical. The current implementation measures the following variables:

- Air temperature
- Relative humidity

For more detailed information on the measured parameters, see Vaisala HUMICAP® Humidity and Temperature Transmitter Series HMT330 User's Guide.

Configuring HMT330

The HMT330 sensor is connected to MAWS through an RS-232 serial line. There are two alternatives to connect the HMT330 sensor to MAWS:

1. RS-232 autosend mode where HMT330 automatically sends measurement data to MAWS. Only one HMT330 per serial line is allowed.
2. RS-232 polled mode. Only one HMT330 per serial line is allowed.

The default data transmission parameters are the following: *9600 bps, 8 data bits, no parity, 1 stop bit*.

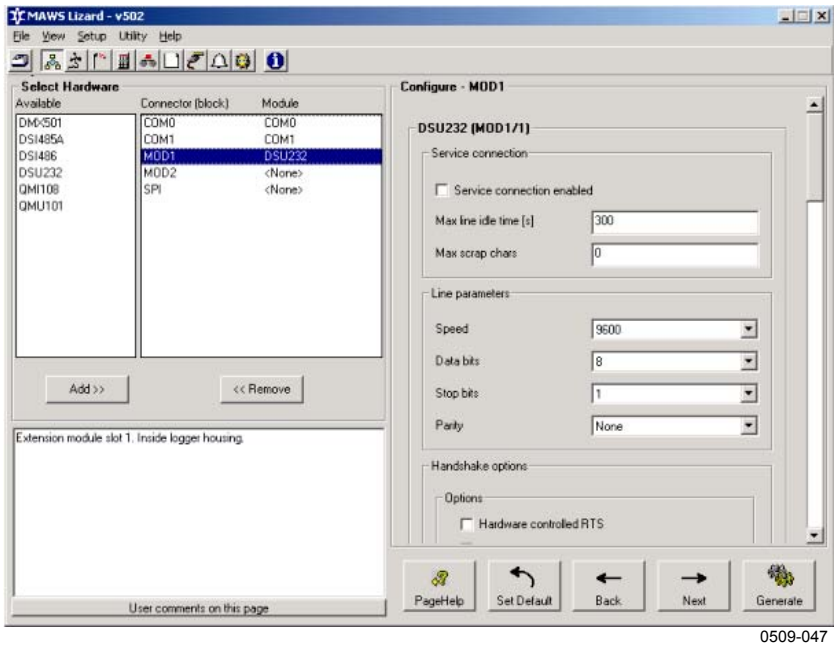
For more information on wiring of the RS-232 options, see Automatic Weather Station MAWS301 Installation Manual. For more information on configuring serial ports, see MAWS Lizard Setup Software User's Guide.

HMT330 is configured using MAWS Lizard Setup Software. Proceed as follows:

1. Start MAWS Lizard.
2. Open an existing setup in the **Setup** view or create a new one.
3. Proceed to the **Hardware** view by clicking **Next** to configure serial transmission hardware, see Figure 43 below.

   In this example, MOD1/1 on DSU232 is selected for use with the HMT330 sensor.

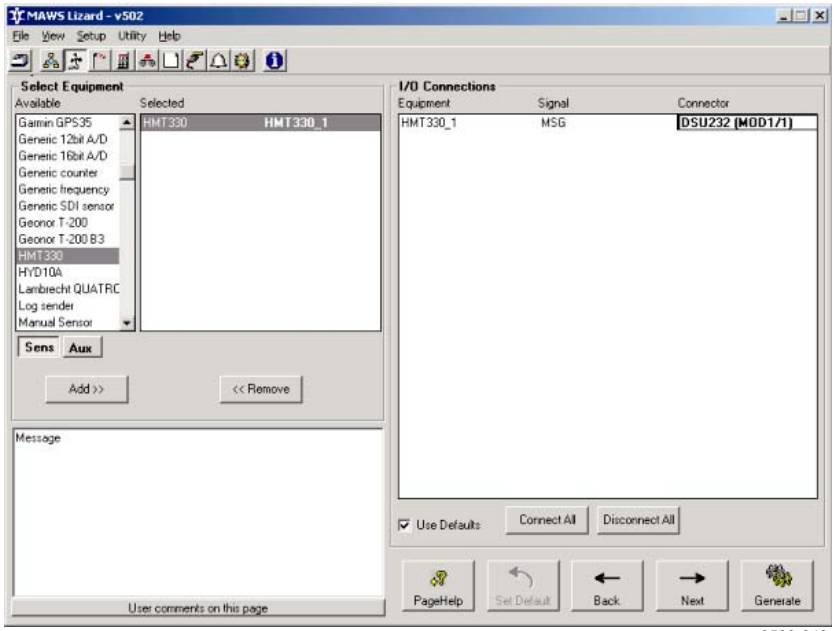
   You are recommended to keep the default settings in the **Line parameters** frame.



0509-047

Figure 43 Hardware View: Configuring Serial Transmission Hardware for HMT330

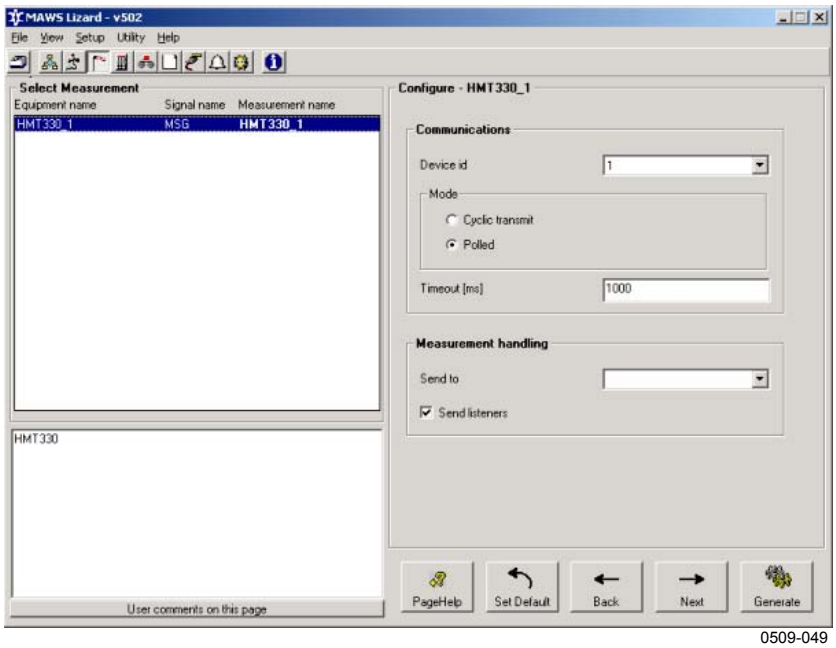
4. Proceed to the **Equipment** view by clicking **Next**, see Figure 44 on page 74.
   a. Scroll down the **Available** list for HMT330.
   b. Click the **Add** button to select HMT330.
   c. Double-click the **Connector** list for HMT330 in the **I/O Connections** frame in order to select the COM port.



0509-048

Figure 44 Equipment View: Selecting I/O Connection for HMT330

5. Proceed to the **Measurements** view by clicking **Next**, see Figure 45 below:



0509-049

Figure 45 Measurements View: Configuring HMT330 Communications Options

There are several parameter options you can set in the **Communications** frame of the **Measurements** view. Note that, in general, the predefined settings are the most suitable for a typical MAWS setup.

In order to change a parameter option, you simply need to select or unselect the corresponding check box. The following options are available:

- Use the **Device ID** (editable) text box to distinguish HMT33. For information on how to change the device ID, see Vaisala HUMICAP® Humidity and Temperature Transmitter Series HMT330 User's Guide.
- Select the **Mode** in which HMT330 is operated. When you select the **Cyclic transmit** mode, HMT330 automatically sends data at predefined intervals. If you select the **Polled** mode, MAWS polls HMT330 at predefined intervals to retrieve data.
- In the Polled mode, by using the **timeout** parameter you can define the maximum length of time allowed for HMT330 to reply.
- In the **Cyclic transmit** mode, with the communication timeout parameters you can define a maximum interval between two messages. If the new message from HMT330 has not been received within the given time, the data in that message is then marked as invalid.

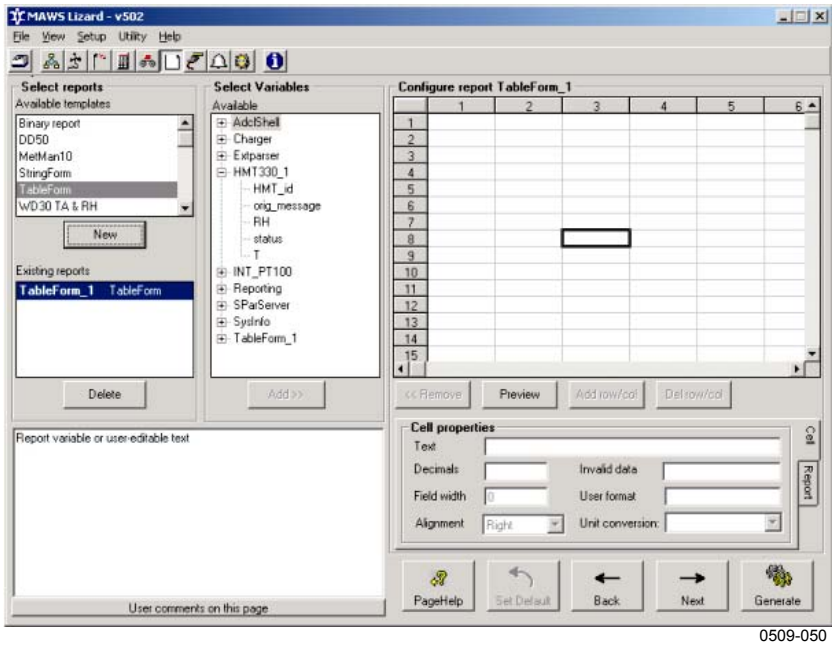
Using HMT330 Variables in Reports

You can use the variables received from HMT330 in MAWS Lizard like those from any other sensor.

To check which variables are available, proceed as follows:

1. Go to the **Reports** view.
2. Create a new report or select an existing one to include the variables for HMT330. See Figure 46 on page 76.
3. Click *HMT330_1* in the **Available** list box in the **Select Variables** frame.

4. Lizard displays the items that are available for the source in question. For more information on these variables, refer to Vaisala HUMICAP® Humidity and Temperature Transmitter Series HMT330 User's Guide.

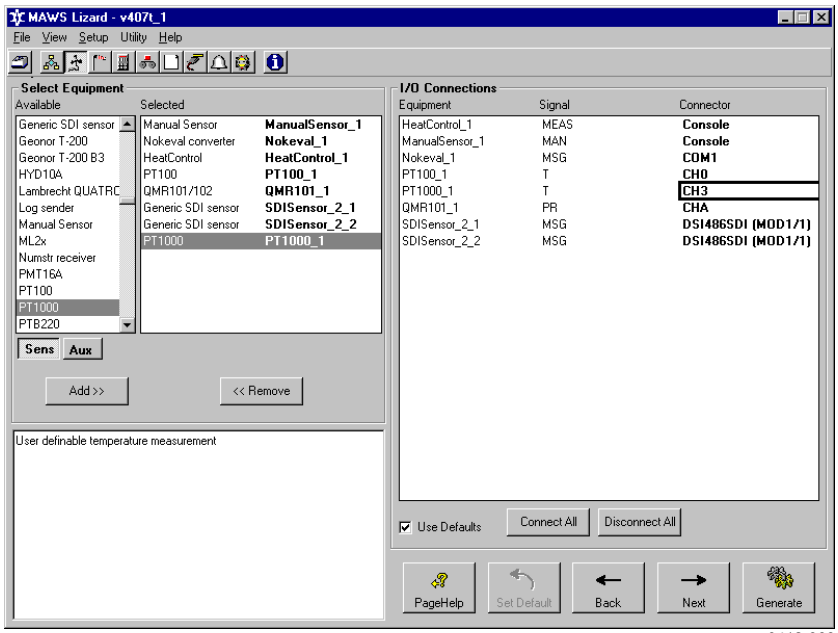


0509-050

Figure 46 Reports View: Selecting HMT330 Variables

Temperature Measurement PT1000

With MAWS software, you can measure PT1000 elements. In the **Equipment** view, select the PT1000 sensor from the **Available** list and connect the sensor to the desired connector, see Figure 47 on page 77.

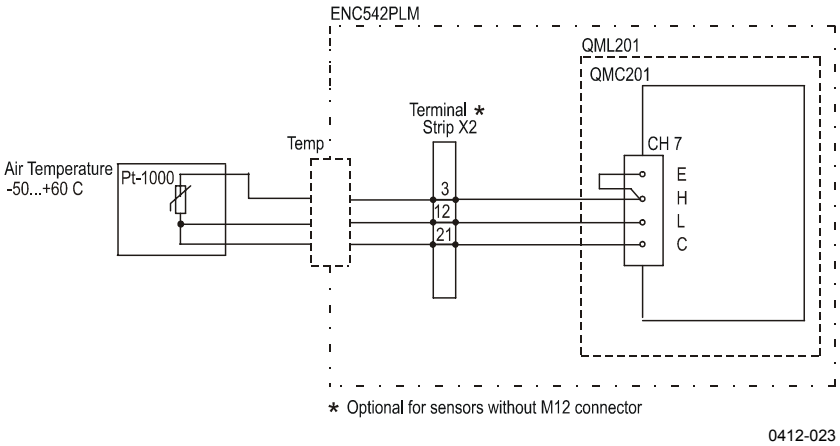


0412-066

Figure 47 Equipment View: Selecting I/O Connections for PT1000

By default, the PT1000 measurement is a 3-wire connection but you can change it to a 4-wire connection on the **Advanced** user level by changing the measurement type. Typically, you do not need to change the predefined PT1000 sensor parameters. Only the data validation parameters can vary, depending on the installation site. You can see all parameters as an **Advanced** user.

See Figure 48 below and Figure 49 on page 78 for the wiring diagrams for 3-wire and 4-wire connections of the PT1000 probe.



0412-023

Figure 48 Wiring Diagram for 3-Wire Connection

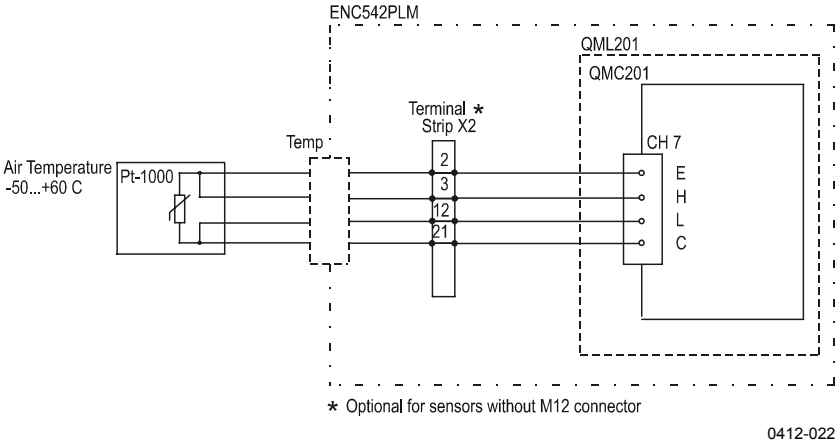


Figure 49 Wiring Diagram for 4-Wire Connection

Temperature Measurement PT100 in 3-Wire Connection

The PT100 sensor in a 3-wire connection is rarely used but can be configured with MAWS Lizard like any other sensor.

In the **Equipment** view, select the predefined PT100 sensor from the list. Proceed then to the **Measurements** view and select a PT100 measurement. In order to change to a 3-wire measurement, change the user level to **Advanced**. The first parameter indicates whether the measurement in question is a 3- wire or a 4-wire one. You do not need to change any other parameter default values.

Absolute Shaft Encoder

Absolute Shaft Encoder QSE104 measures water level in a stilling well. It is based on a true absolute shaft encoder that uses SSI (Synchronous-Serial Interface) for communication. MAWS is connected to the encoder via the QMI102 module that reads data from the encoder and sends it as ASCII via the RS-232 or RS-485 line. QMI102 may be connected to MAWS COM1 or any other communication port that supports either RS-232 or RS-485. The QMI102 module is installed inside the MAWS enclosure.

See also Configuring QSE101 Shaft Encoder with MAWS Lizard Technical Reference.

Figure 50 Absolute Shaft Encoder QSE104

Configuring Absolute Shaft Encoder QSE104

To add the QSE104 sensor into your system setup, proceed as follows:

1. Go to the **Equipment** view of MAWS Lizard and select QSE104 from the sensor list, see Figure 51 on page 80.
2. Connect QSE104 to an available serial port

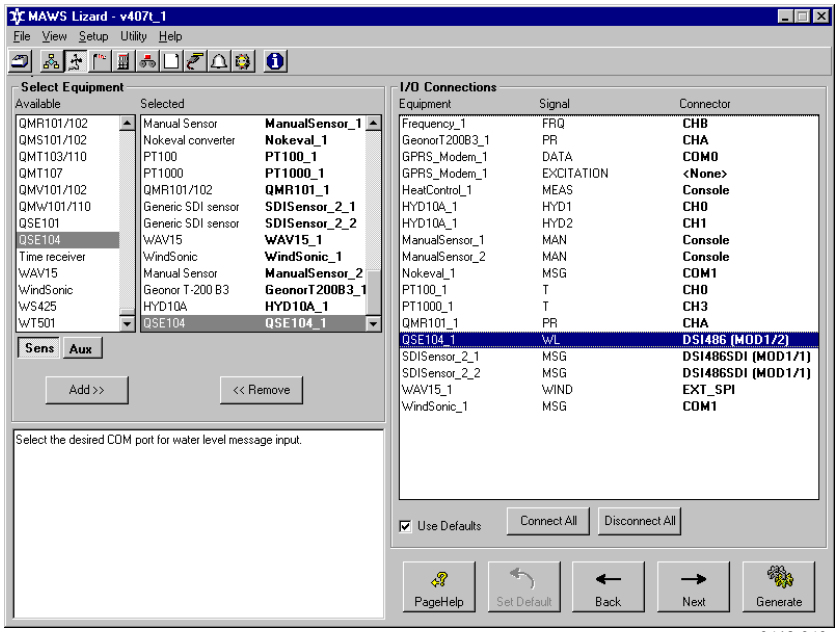


Figure 51 Equipment View: QSE104 Connected to the Optional DSI486 Module

3. Click **Next** or go to the **Measurements** view. All the parameters are predefined. If there are more than one device on the same RS-485 line, the device IDs must be different. See Figure 52 below.

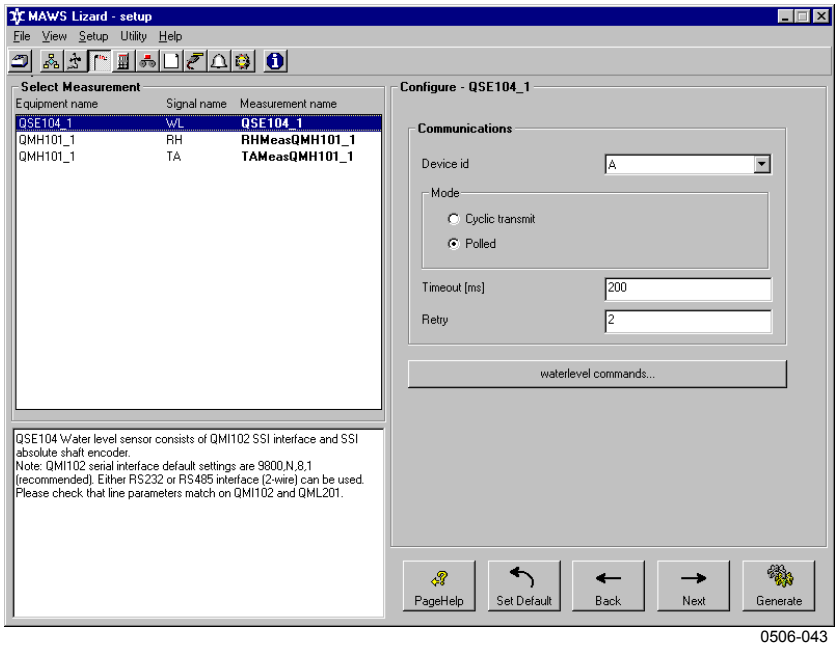


Figure 52 Measurements View: Configuring Communications

Setting Current Water Level for Absolute Shaft Encoder

You can read or set the current water level, that is, the current data value of the shaft encoder, using the following command in MAWS Terminal:

waterlevel [*new value*]

If you enter the parameter *new value*, the current data value is set as the parameter value. If you do not enter the parameter, then the current data value is displayed.

For example, read the current water level using the following command:

```
/> waterlevel
water level = 12.3400 m
```

For example, to set the current water level to 5.480 meters, give the following command:

```
/> waterlevel 5.480
water level = 5.4800 m
```

Setting Current Water Level for Multiple Sensors

If you have more than one QSE104 sensor in your system setup, you must define the device number when entering the **waterlevel** command. To see which command is associated with a certain device, click the **waterlevel commands...** button in the **Communications** frame of the **Measurements** view in MAWS Lizard, as seen in Figure 52 on page 80. A window opens, displaying the QSE104 devices and the commands associated with them, see Figure 53 on page 82.

Figure 53 MAWS Lizard Waterlevel Window

For example, to set the current waterlevel to 6.120 meters for the QSE104_2 sensor, give the following command in MAWS Terminal:

```
/> waterlevel_2 6.120
water level = 6.1200 m
```

Geonor Water Gauge

The Geonor T-200B3 precipitation gauge contains three separate vibrating wire sensors. The outputs of these sensors are connected to the frequency input of the channel A or B in MAWS.

The sensors are powered separately through the excitation output of the channel A, B, 0, 1, 2, 3 or 4. Other excitation controls that can feed 12 V can be used as well.

The vibrating wire sensor of Geonor T-200B3 outputs a frequency in the range from 700 to 4000 Hz, from which the precipitation accumulation amount can be calculated by the Geonor T-200B3 component for each sensor. In addition, precipitation/evaporation amount for current period is calculated from the change of accumulation. After that, a specified algorithm is applied to get the combined precipitation value from these three sensor values.

For wiring of the sensor, see Figure 54 on page 83.

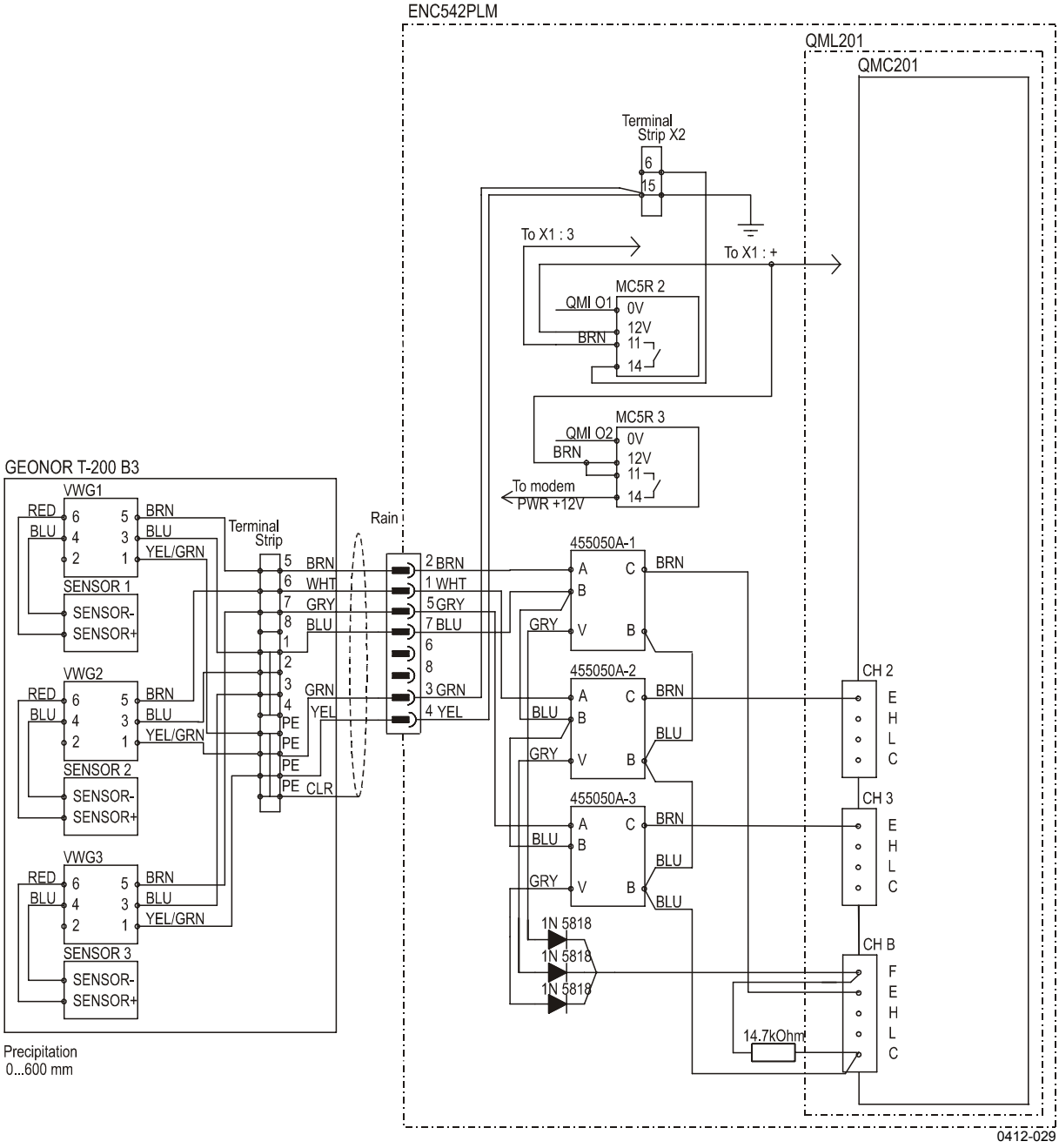


Figure 54 Example Wiring Diagram for Geonor T200 B3

The sensor has three calibration coefficients that are supplied by the manufacturer of the sensor. They must be given to MAWS using the following static parameters:

1. Three calibration coefficients for each sensor, see Table 4 below.

Table 4 Calibration Coefficients for Sensors

Sensor	Calibration Coefficients
Sensor 1	geonort200_A_1
	geonort200_B_1
	geonort200_f0_1
Sensor 2	geonort200_A_2
	geonort200_B_2
	geonort200_f0_2
Sensor 3	geonort200_B_3
	geonort200_A_3
	geonort200_f0_3

2. Optional zero level parameters, see Table 5 below. These are values in millimeters measured by the sensor when the precipitation sum should be reported as zero.

Table 5 Optional Zero Level Parameters for Sensors

Sensor	Zero Level Parameter
Sensor 1	geonort200_offset_1
Sensor 2	geonort200_offset_2
Sensor 3	geonort200_offset_3

These parameters can be set in one of the following three ways:

a. In Lizard **Setup** view, in the **Static Parameters** tab.

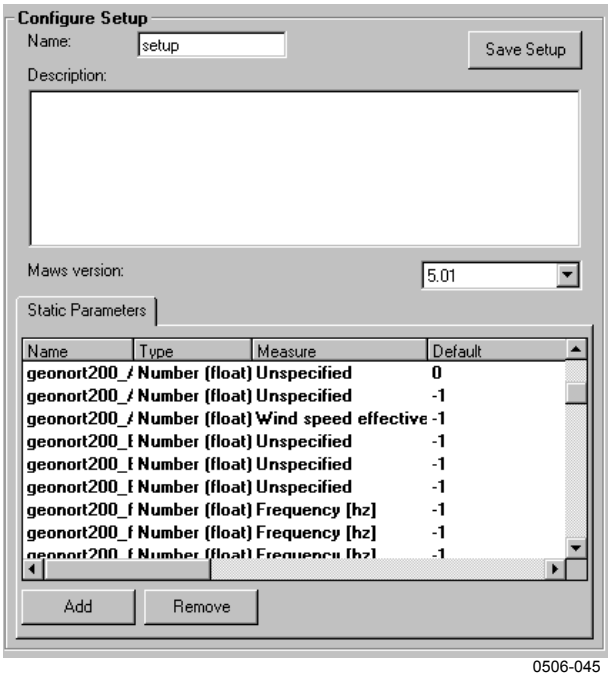


Figure 55 Static Parameters of Geonor Rain Gauge

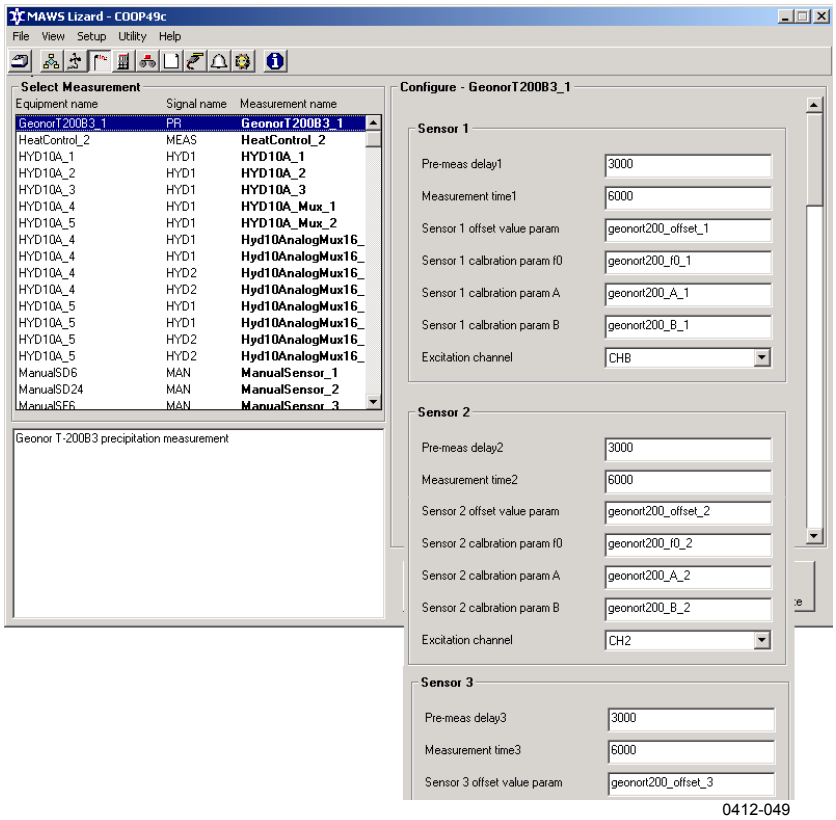


Figure 56 Measurements View: Configuring Geonor

b. Using MAWS or PALM Terminal. There is a static parameter editor in the **Station Settings** window. See Figure 57 below.

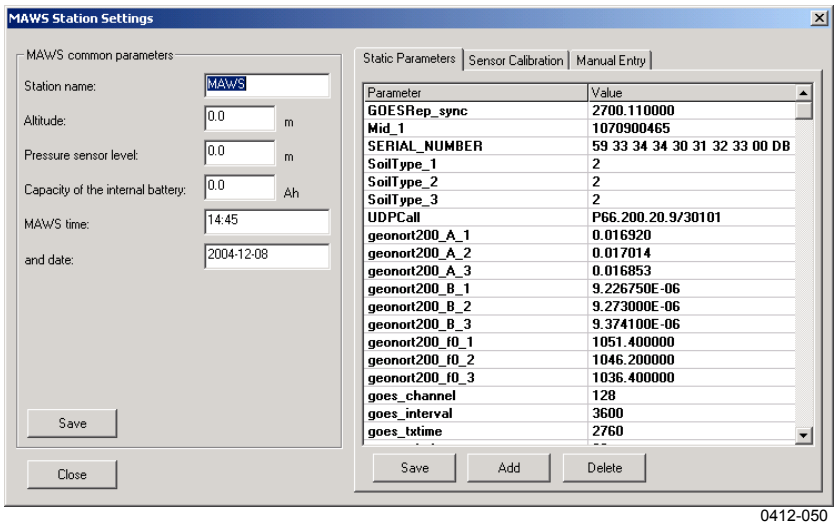


Figure 57 Static Parameters in MAWS Terminal

c. Using maintenance connection and the **spset** command. The following example sets parameters for sensor 1:

```
>\ spset geonort200_f0_1 1051.4
>\ spset geonort200_A_1 0.016920
>\ spset geonort200_B_1 0.000009226750
```

Configuring Geonor Water Gauge T-200B3

To configure the Geonor T-200B3 sensor, proceed as follows:

1. Go to the **Equipment** view in MAWS Lizard.
2. Select Geonor T-200B3 from the sensor list and click the **Add** button.
3. Click **Next** to proceed to the **Measurements** view, see Figure 58 below.
4. Click the sensor you created to configure it.
5. There are two parameters for each sensor. Leave the default values.
6. You can select the precipitation algorithm under **Common**. The number of sensors has to be valid for the algorithm.

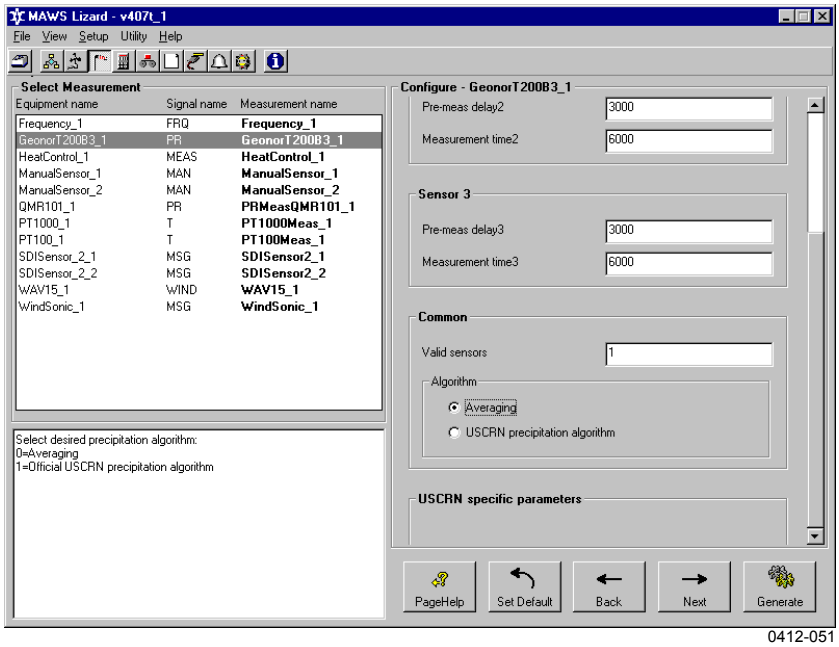


Figure 58 Measurements View: Configuring Geonor T-200 B3

In the **Algorithm** frame, the first option **Averaging** is a Vaisala proprietary algorithm. The **USCRN precipitation algorithm** is a US Climate Reference Network algorithm that is published on the USCRN www pages.

Valid sensors box specifies how many of the three sensor measurements must have VALID status before the final calculation of the results.

Output Parameters

On the **Advanced** user level, there are enhanced configuration options available which refer to data items automatically sent every time the sensor is measured. Normally, these options do not need to be changed. See Figure 59 below.

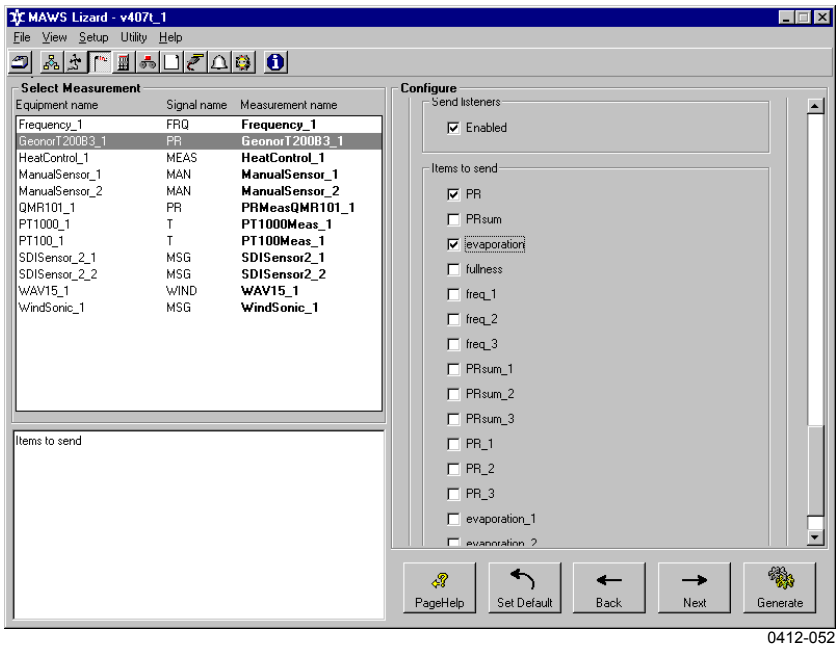


Figure 59 Measurements View: Configuring Items to Send

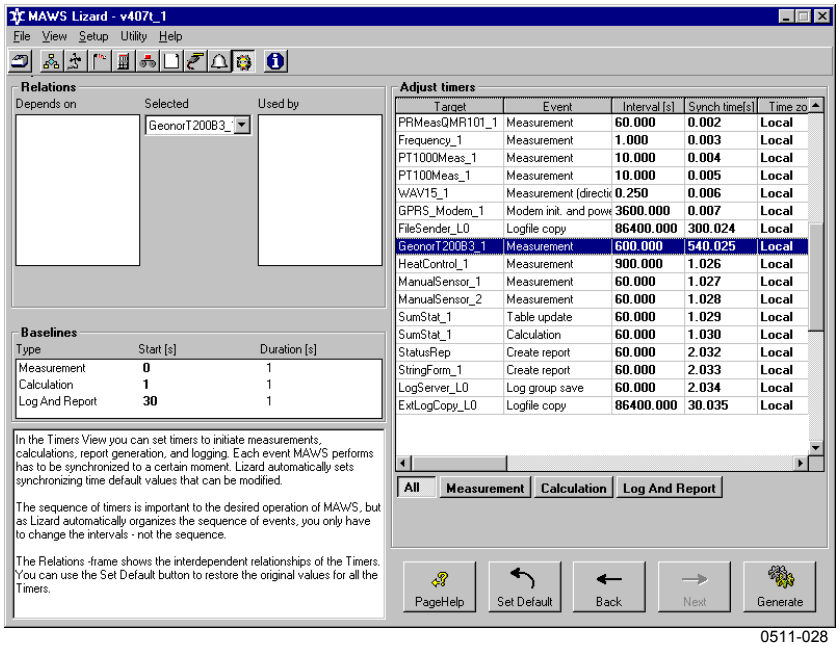
The parameters illustrated above are available to be included, for example, in calculations, reports and/or for data logging.

All output parameters are listed in Table 6 on page 89. Type *Double* is comparable to type *Float*.

Table 6 Output Parameters

Parameter ID	Type	Description
PR	Double	Precipitation detected and reported by selected algorithm in user-set calculation interval
PRsum	Double	Precipitation accumulation (depth) reported by selected algorithm (default: average of all valid sensors)
evaporation	Double	Evaporation detected and reported by selected algorithm in user-set calculation interval
fullness	Double	Indicates in per cents (0.. 100 %) how much of the bucket capacity is used
freq_1	Double	Measured frequency of sensor 1
freq_2	Double	Measured frequency of sensor 2
freq_3	Double	Measured frequency of sensor 3
PRsum_1	Double	Precipitation accumulation (depth) reported by sensor 1
PRsum_2	Double	Precipitation accumulation (depth) reported by sensor 2
PRsum_3	Double	Precipitation accumulation (depth) reported by sensor 3
PR_1	Double	Precipitation detected and reported by sensor 1 in user-set calculation interval
PR_2	Double	Precipitation detected and reported by sensor 2 in user-set calculation interval
PR_3	Double	Precipitation detected and reported by sensor 3 in user-set calculation interval
evaporation_1	Double	Evaporation detected and reported by sensor 1 in user-set calculation interval
evaporation_2	Double	Evaporation detected and reported by sensor 2 in user-set calculation interval
evaporation_3	Double	Evaporation detected and reported by sensor 3 in user-set calculation interval

The calculation interval can be set in the **Timers** view. In Figure 60 on page 90, the interval is five minutes, which is a typical setting.


MAWS Lizard - v407t_1
File View Setup Utility Help
Relations
Depends on
Selected
Used by
GeonorT200B3_1
Baselines
Type
Start [s]
Duration [s]
Measurement 0 1
Calculation 1 1
Log And Report 30 1
In the Timers View you can set timers to initiate measurements, calculations, report generation, and logging. Each event MAWS performs has to be synchronized to a certain moment. Lizard automatically sets synchronizing time default values that can be modified.
The sequence of timers is important to the desired operation of MAWS, but as Lizard automatically organizes the sequence of events, you only have to change the intervals - not the sequence.
The Relations -frame shows the interdependent relationships of the Timers. You can use the Set Default button to restore the original values for all the Timers.
Adjust timers
Target Event Interval [s] Synch time[s] Time zo
PRMeasQMR101_1 Measurement 60.000 0.002 Local
Frequency_1 Measurement 1.000 0.003 Local
PT1000Meas_1 Measurement 10.000 0.004 Local
PT100Meas_1 Measurement 10.000 0.005 Local
WAV15_1 Measurement (directi 0.250 0.006 Local
GPRS_Modem_1 Modem init. and powe 3600.000 0.007 Local
FileSender_L0 Logfile copy 86400.000 300.024 Local
GeonorT200B3_1 Measurement 600.000 540.025 Local
HeatControl_1 Measurement 900.000 1.026 Local
ManualSensor_1 Measurement 60.000 1.027 Local
ManualSensor_2 Measurement 60.000 1.028 Local
SumStat_1 Table update 60.000 1.029 Local
SumStat_1 Calculation 60.000 1.030 Local
StatusRep Create report 60.000 2.032 Local
StringForm_1 Create report 60.000 2.033 Local
LogServer_L0 Log group save 60.000 2.034 Local
ExtLogCopy_L0 Logfile copy 86400.000 30.035 Local
All
Measurement
Calculation
Log And Report
PageHelp
Set Default
Back
Next
Generate

0511-028

Figure 60 Timers View: Adjusting Timers for Geonor T-200

Rim Heating

The rim heating software component is designed to be used with the Geonor T-200B3 precipitation gauge. This component offers several parameters to control the heating element of the Geonor T-200B3 sensor. There are no restrictions for using this component elsewhere if similar type of control is required.

There are four input values that you can use as checkpoints:

- Air temperature, mandatory
- Precipitation, optional
- Battery voltage, optional
- AC (preliminary) power, optional

Additionally, MAWS setup includes user-definable parameters to further refine the rim heating algorithm. Figure 61 on page 91 shows the control flow.

The heating option is not a standard, field-proven one for Geonor T-200B3 and you are therefore recommended to contact Vaisala in case you wish to use it.

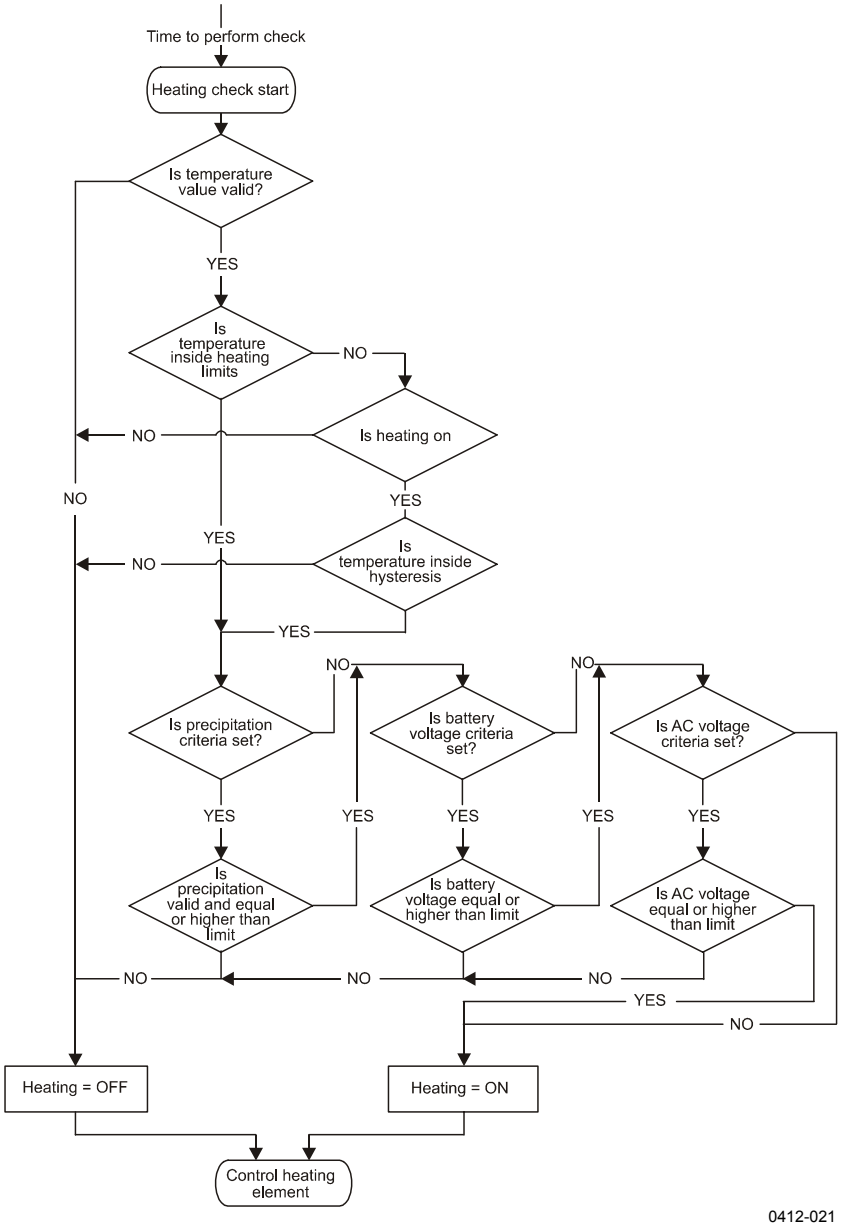
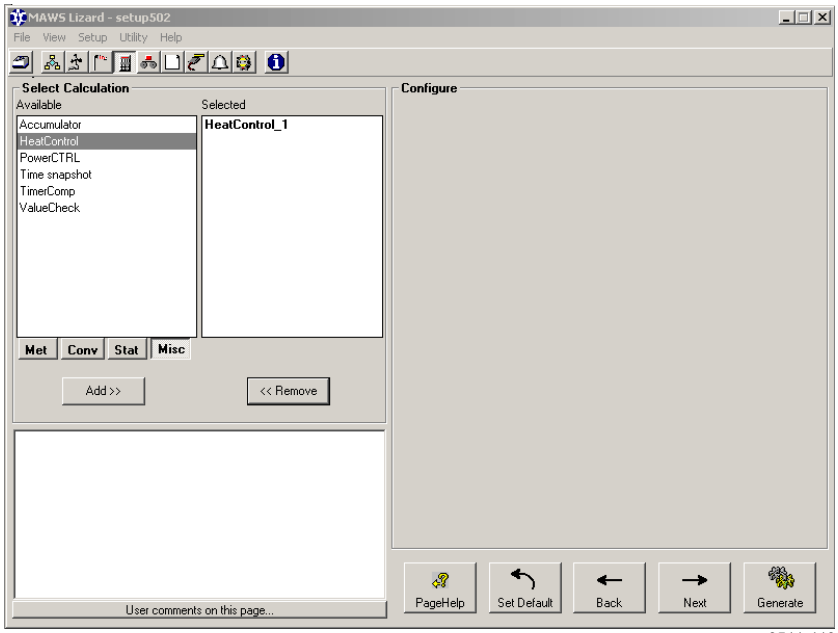


Figure 61 Control Flow for Heating

Selecting and Configuring HeatControl Component

The HeatControl component is available in the **Calculations** view, see Figure 62 on page 92.

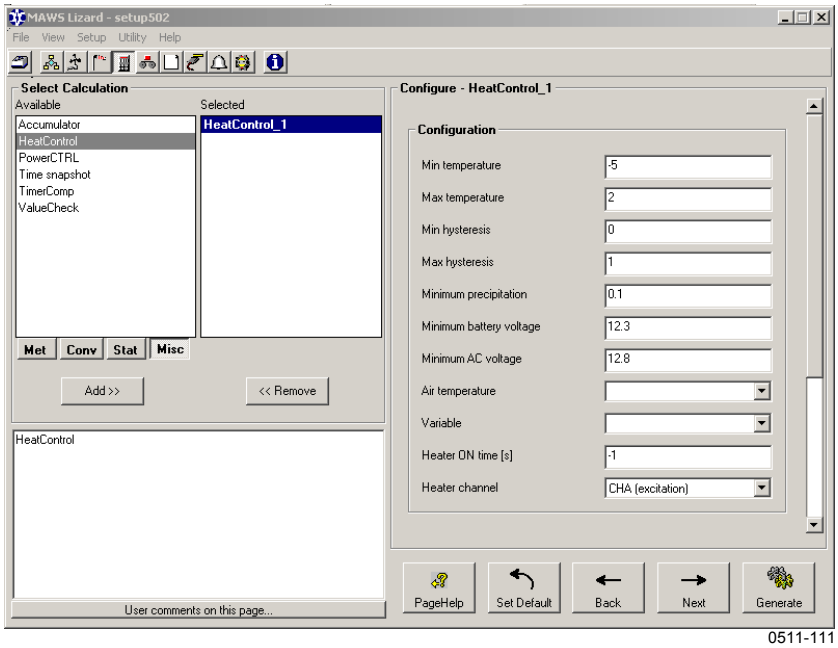
1. In the **Select Calculation** frame, click the **Misc** button to display a list of miscellaneous calculations.
2. Select **HeatControl** from the list and click **Add**.
3. **HeatControl_x** appears in the **Selected** frame.



0511-110

Figure 62 Calculations View: Selecting HeatControl

4. To configure the HeatControl component, click on **HeatControl_x** in the **Selected list**. Configuration options in the **Configure** frame appear, see Figure 63 below:



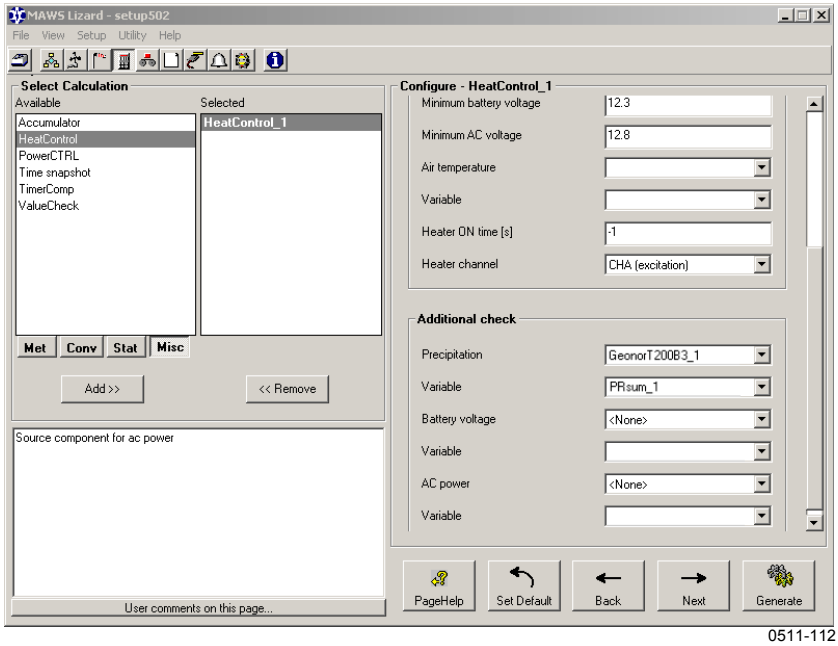
0511-111

Figure 63 Calculations View: Configuring HeatControl Component (1/2)

The first part of the configuration includes the mandatory parameters and some advanced parameters needed only if an **Additional check** is selected. See Figure 64 on page 93.

You can configure the following parameters:

- Minimum and maximum air temperature and source for air temperature measurement
- Hysteresis for both minimum and maximum values
- Minimum precipitation limit that the precipitation must exceed in order to activate heating. This is used only if the source for precipitation check is set.



0511-112

Figure 64 Calculations View: Configuring HeatControl Component (2/2)

- Minimum battery voltage limit to prevent emptying of batteries. This is used only if the source for battery voltage check is set.
- Minimum primary voltage limit to enable heating only if primary power is present. This is used only if the source for AC power check is set.
- Heater ON time that tells how many seconds the heating element will be activated for if heating criteria are met. For example, if heating is checked every 15 minutes and the value of this parameter is 300 (5 minutes), the heating element is first active for 5 minutes and then switched off for the last 10 minutes before the next check.

- Heater channel to select the control output for the heating element. Typically, the QMI102 digital I/O unit is used to control the heating element, but it is also possible to use the excitation pins of the channels CH0..3 and CH A/B .

The HeatControl component is activated by a user-definable timer, configured like any other timer. In the example Figure 65 below, the heating check is performed every 15 minutes:

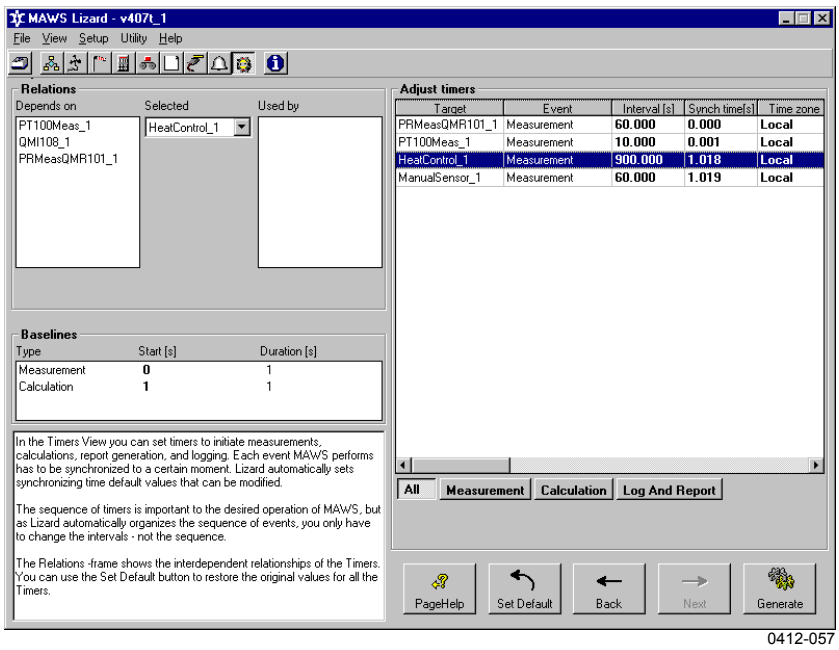

MAWS Lizard - v407t_1
File View Setup Utility Help
Relations
Depends on
Selected
Used by
PT100Meas_1
QMI108_1
PRMeasQMR101_1
HeatControl_1
Adjust timers
Target Event Interval [s] Synch time[s] Time zone
PRMeasQMR101_1 Measurement 60.000 0.000 Local
PT100Meas_1 Measurement 10.000 0.001 Local
HeatControl_1 Measurement 900.000 1.018 Local
ManualSensor_1 Measurement 60.000 1.019 Local
Baselines
Type Start [s] Duration [s]
Measurement 0 1
Calculation 1 1
In the Timers View you can set timers to initiate measurements, calculations, report generation, and logging. Each event MAWS performs has to be synchronized to a certain moment. Lizard automatically sets synchronizing time default values that can be modified.
The sequence of timers is important to the desired operation of MAWS, but as Lizard automatically organizes the sequence of events, you only have to change the intervals - not the sequence.
The Relations -frame shows the interdependent relationships of the Timers. You can use the Set Default button to restore the original values for all the Timers.
All
Measurement
Calculation
Log And Report
PageHelp
Set Default
Back
Next
Generate
0412-057

Figure 65 Timers View: Activating HeatControl Component

Hydra Sensor HYD-10A

For soil measurement applications, it is possible to configure Stevens Hydra Sensor HYD-10A for MAWS. This sensor has four analog outputs, reserving two analog measuring channels for each sensor.

In order to use this sensor, please contact Vaisala for more information. The standard Vaisala sensors for soil moisture measurements are ML2x and ECH2O.

Lambrecht QUATRO-IND

Lambrecht QUATRO-IND is a weather instrument that measures the following variables:

- Wind speed and direction
- Air temperature
- Humidity and dewpoint
- Air pressure

Configuring Lambrecht QUATRO-IND

Communications Setup

The QUATRO-IND weather sensor is connected to MAWS through a RS-485 serial line. MAWS has several alternatives for connecting RS-485 sensors:

- Integrated RS-485 port (COM1)
- DSI485A, 1 RS-485 port, 2-wire or 4-wire connection
- DSI486, 2 RS-485 ports, 2-wire

Data transmission parameters are the following: *4800 bps, 8 data bits, no parity, 1 stop bit*.

QUATRO-IND automatically sends each parameter once a second, four data messages per second in total.

For more information on wiring of the RS-485 options, refer to Automatic Weather Station MAWS301 Installation Manual. For more information on configuring serial ports, refer to MAWS Lizard Setup Software User's Guide.

Configuring the Sensor

QUATRO-IND is configured using MAWS Lizard. Proceed as follows:

1. Start MAWS Lizard.
2. Open an existing setup or create a new one.

3. Go to the **Hardware** view, see Figure 66 below.

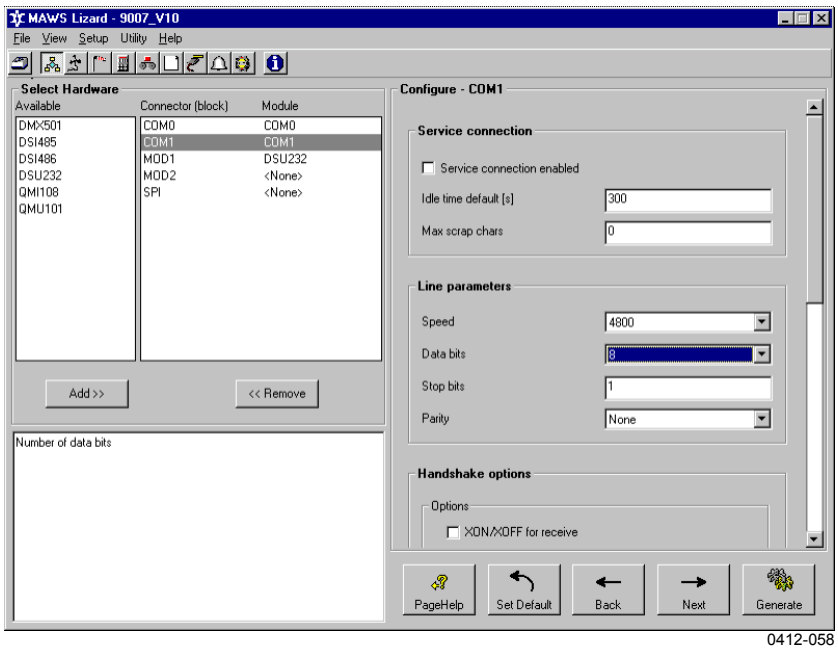
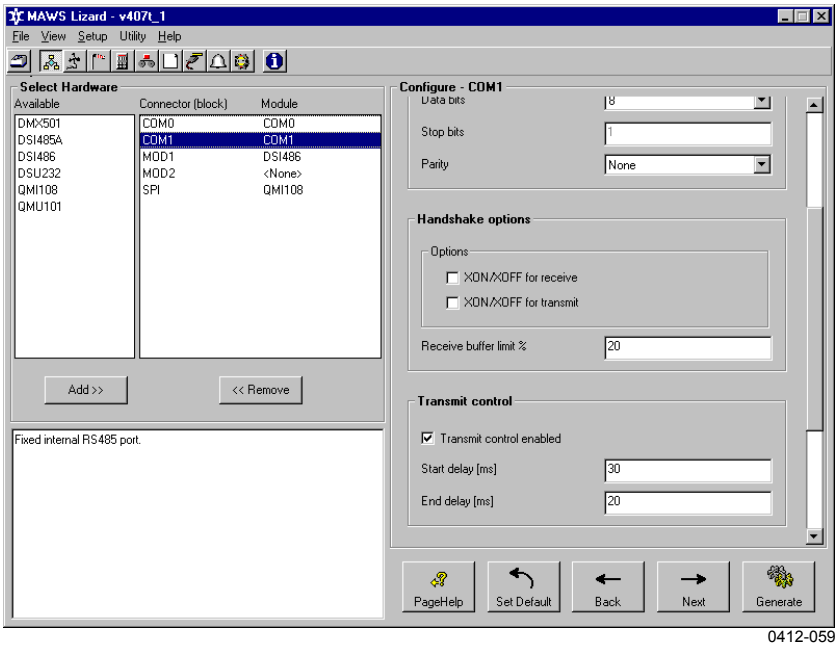


Figure 66 Hardware View: Configuring QUATRO-IND (1/2)

In the example above, COM1 has been selected for use with the QUATRO-IND sensor. Under **Line parameters** the settings are: *4800*, *8*, *1*, *none*.

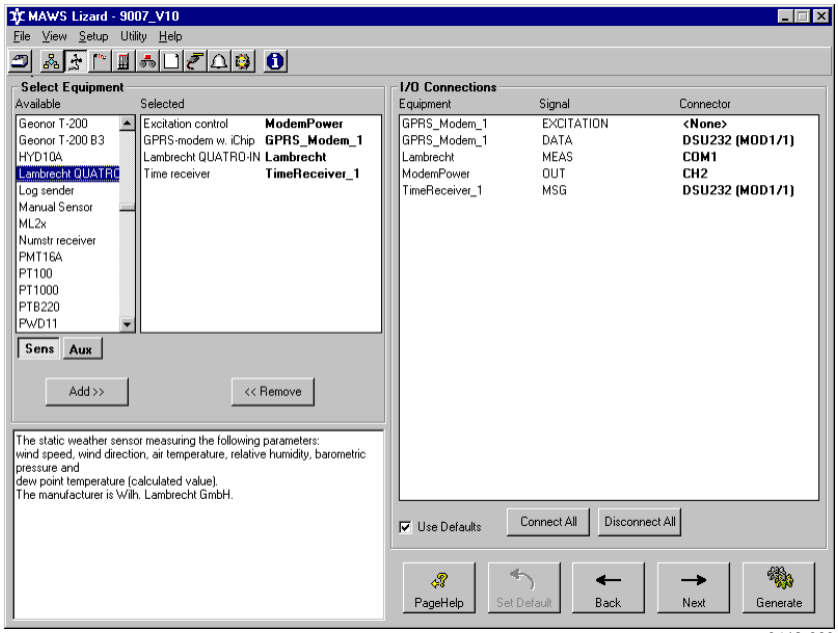
NOTE Scroll down for **Transmit Control** to select **Transmit control enabled**, as otherwise MAWS keeps the tx driver continuously ON and receiving is not possible. See Figure 67 on page 97.



0412-059

Figure 67 Hardware View: Configuring QUATRO-IND (2/2)

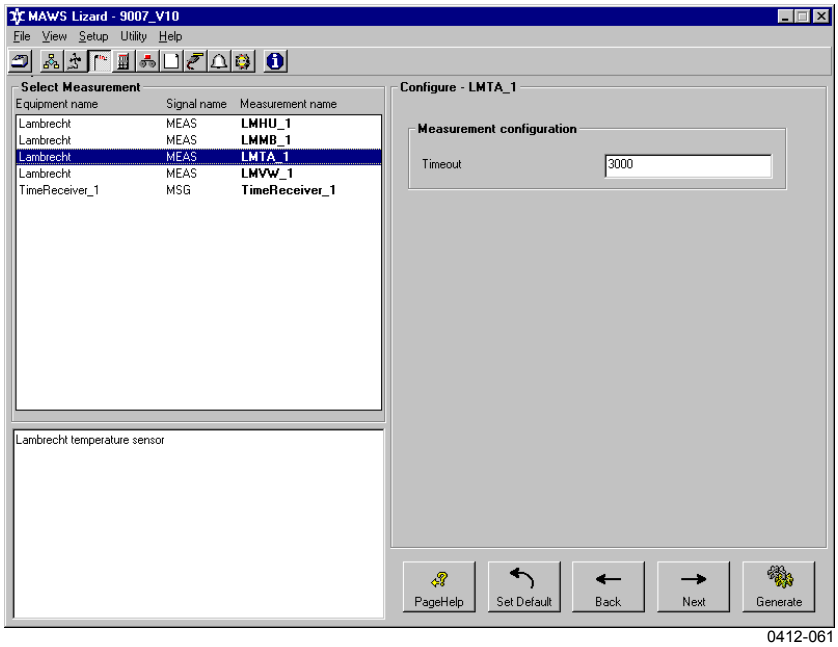
4. Select **Next** to go to the **Equipment** view, see Figure 68 on page 98.
   - Scroll down the **Available** list to find Lambrecht QUATRO-IND.
   - Click the **Add** button to select Lambrecht QUATRO-IND.
   - Double click the **Connector** field for Lambrecht in order to select the COM port.



0412-060

Figure 68 Equipment View: Selecting I/O Connection

5. Select **Next** to go to the **Measurements** view, see Figure 69 below.



0412-061

Figure 69 Measurements View: Configuring QUATRO-IND

There are four internal pieces of MAWS equipment for QUATRO-IND, one component for each measurement to be reported, see Figure 69 above. When you select a row with an equipment and a

measurement, the information pane shows the actual sensor. You can separately enter the **Timeout** value for each measurement; the default is 3 seconds.

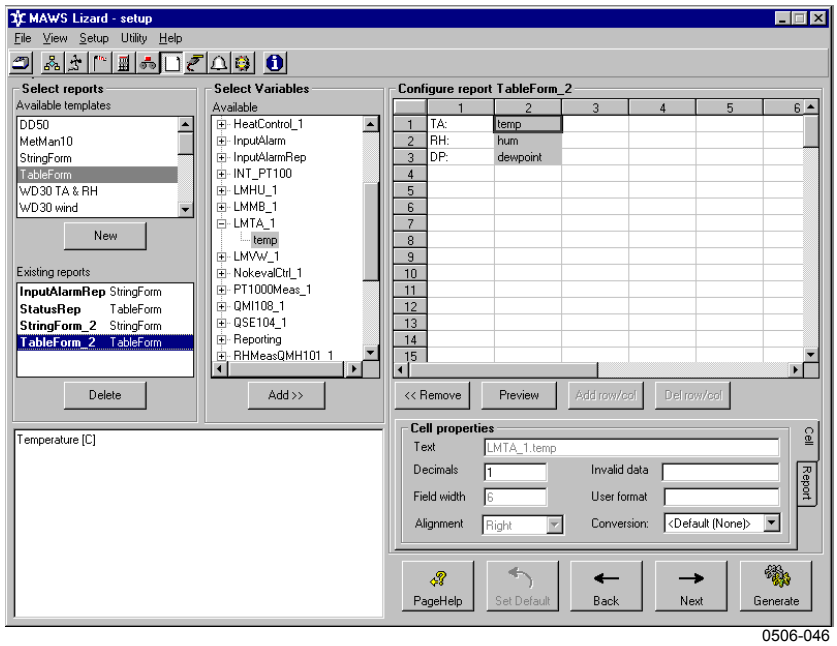
Next, you can use the measurements of QUATRO-IND as usual. The measurements listed in Table 7 below are available:

Table 7 Measurement Names for QUATRO-IND

Measurement Name	Description
LMHU_1	For humidity
LMMB_1	For barometer
LMTA_1	For air temperature
LMVW_1	For wind speed and direction

For example, air temperature can be added into a report with the following procedure:

1. Select the **Reports** view, see Figure 70 below.
2. Click **LMTA_1** in the **Available** list.
3. Lizard opens parameters that are available for the component in question. In this case, only temperature is available.



0506-046

Figure 70 Reports View: Configuring Report

Sensor Monitoring

To test if the communication between MAWS and the QUATRO-IND sensor works properly, proceed as follows:

1. Start MAWS Terminal and open the maintenance connection.
2. Check communication by opening a connection between the maintenance port and sensor. When supposing that the QUATRO-IND sensor is connected to COM1).

```
/>open COM1
Terminal I/O re-routed to COM1
```

If another RS-485 port is being used, you can establish a maintenance connection to the QUATRO-IND using the **open** command with the applicable parameters listed in Table 8 below.

Table 8 Parameters for the Open Command

Connector in MAWS Lizard	Parameter
COM1	COM1
DSI486 (MOD1/1)	DSI486_0_0 1)
DSI486 (MOD1/2)	DSI486_0_1 1)
DSI486 (MOD2/1)	DSI486_1_0 1)
DSI486 (MOD2/2)	DSI486_1_1 1)

1) With DSI486 module, the number between underline characters stands for the module place, that is, MOD1 or MOD2, and the last number for the channel on that particular module.

Now you should see data messages coming from QUATRO-IND, as listed in Table 9 below.

Table 9 QUATRO-IND Messages

Message	Description
$WIMWV...	Wind speed and direction message
$WIMTA...	Air temperature message
$WIMHU...	Humidity message
$WIMMB...	Barometer message

For more information about the message format, refer to the QUATRO-IND user's guide.

Each parameter is updated once a second, so you should see four messages received every second. If no data is received, check that:

- QUATRO-IND is powered up,
- wires are correctly connected, and
- serial parameters are correctly set in MAWS Lizard.

Finally, close the terminal connection:

```
/> close
```

3. Check that MAWS receives parameters from QUATRO-IND correctly.

   You can retrieve the original received message as a whole or single parameters from the measurement using the **LASTVAL** command. See Table 10 below.

Table 10 Commands for Retrieving Values

Measurement	Value	Command with Parameter
Wind speed and direction	Raw message	**LASTVAL** *LMVW_1 orig_mwv F*
	Wind speed	**LASTVAL** *LMVW_1 spd F*
	Wind direction	**LASTVAL** *LMVW_1 dir F*
Air temperature	Raw message	**LASTVAL** *LMTA_1 orig_mta F*
	Temperature	**LASTVAL** *LMTA_1 temp F*
Humidity	Raw message	**LASTVAL** *LMHU_1 orig_mhu F*
	Humidity	**LASTVAL** *LMHU_1 hum F*
	Dew point	**LASTVAL** *LMHU_1 dewpoint F*
Barometer	Raw message	**LASTVAL** *LMMB_1 orig_mmb F*
	Pressure	**LASTVAL** *LMMB_1 press F*

When MAWS is receiving parameters correctly and regularly, the response, for example, for valid air pressure measurement is as follows:

```
Status:1  Value: 998.9
```

In case of an error, the response can be one of the those listed in Table 11 below.

Table 11 Error Responses and Probable Causes

Response	Probable Cause
`Target component not found`	The component is misspelled or QUATRO-IND has not been configured
`Invalid ID`	The data item name is misspelled or the **F** flag at the end of the command is missing
`Status:2 Value:..`	The parameter is not received correctly. Possible sources of error: timeout, CRC error

CHAPTER 7

CONFIGURING SERIAL SENSOR INTERFACES

This chapter contains information needed when configuring serial sensor interfaces, that is, connecting sensors that use serial communications to the MAWS301 weather station. Note that this chapter contains only instructions for configuring the interface, not the sensor itself.

The following sensors are covered:

- Present Weather Sensor PWD11/PWD21
- Visibility Sensor FD12 and Present Weather Sensor FD12P
- Ceilometers CL31, CT25K and CT25KAM
- Digital Barometer PTB220
- Ultrasonic Wind Sensor WS425
- WT500 Series Wind Transmitters
- Garmin GPS 35-PC GPS Receiver

The following sensor is covered by a separate Technical Reference:

- Shaft Encoder QSE101

See also chapter Absolute Shaft Encoder on page 78 in this manual.

NOTE This chapter contains only instructions for configuring the interface, not the sensor itself. In addition to this document, you will need the appropriate sensor manual to manage the sensor configuration and hardware setup.

For most of the sensors, wiring depends on the application. You should therefore also have additional wiring instructions and drawings available.

Physical Interface

MAWS logger has five different types of optional serial interfaces available for the sensor connections. For details and wiring for the interface modules, refer to the MAWS user manuals listed in the Related Manuals table on page 6.

The serial communications options are listed in Table 12 below:

Table 12 Serial Communication Options

Interface	Communication Module	Application
RS-232	DSU232 (two RS-232)	Distance < 20 m Single sensor Lowest electrical interference tolerance Full duplex communication
RS-485 (4-wire)	DSI485	Distance up to 1500 m (* Single sensor Better interference tolerance Full duplex communication
RS-485 (2-wire)	DSI485, DSI486 (two RS-485)	Distance up to 1500 m (* Several sensors Better interference tolerance Half duplex communication
Modem	DMX501	Long distances or extreme interference conditions
SDI	DSI486	SDI sensors

NOTE The recommended connection interface is 2-wire RS-485 with a DSI485 module in MAWS logger. This allows an interference-tolerant connection with the possibility to connect several sensors to the same serial line.

NOTE The wiring of the data and power lines depends on the application.

Data Acquisition Methods

In general, there are two alternate methods to connect a serial sensor to the MAWS weather station:

1. Automatic transmission
   - Device transmits the measurement results automatically
   - Only one device per serial port
   - Physical connection can be RS-232 or RS-485
   - Higher data throughput
1. Polled transmission
   - MAWS polls periodically for measurement data
   - Allows multiple sensors per serial port providing that all devices have the RS-485 interface and support multi-device operation.
   - Can also be used for a point-to-point connection with RS-232 or RS-485.
   - Lower data throughput

Typically, sensors with high data output rate, such as wind sensors, should use automatic transmission with only a single connected device per serial line.

Sensors that produce new measurement data only a few times per minute can use polled transmission, and multiple devices can be connected to the same RS-485 line.

Configuring Serial Line Parameters

NOTE	MAWS does not perform any automatic configuration of the connected sensors. You have to perform the configuration and store it manually by using the sensor's own service interface. For sensors without a human readable command interface, extra MAWS shell commands are provided. For further information, refer to detailed sensor interface descriptions or separate Technical References.

NOTE	When a separate service interface, usually RS-232, is available in the sensor, you are recommended to use it for the initial configuration. Note that the 2-wire RS-485 which operates in half duplex does not always provide problem-free access to a service connection. Also note that keystrokes are not echoed by the sensor.

In order to have access to the sensor interface, the serial line parameters have to be set to match those on the sensor. The easiest way to do this is to create a setup with MAWS Lizard Setup Software. Select the correct interface modules and parameters and run the setup.

Once the serial line parameters are correct, MAWS allows a pass-through access to the connected sensors. You can open it from the MAWS command shell by issuing the **open** command according to the following table:

Port	Name
DSU232 / COM1/1	DSU232_0_0
DSU232 / COM1/2	DSU232_0_1
DSU232 / COM2/1	DSU232_1_0
DSU232 / COM2/2	DSU232_1_1
DSI485 / COM1	DSI485_0
DSI485 / COM2	DSI485_1
DSI486 / COM1/1	DSI486_0_0
DSI486 / COM1/2	DSI486_0_1
DSI486 / COM2/1	DSI486_1_0
DSI486 / COM2/2	DSI486_1_1

The following example describes how to access the PWD11 sensor with device identifier *1*, connected to the COM2 / 2 port using a DSI486 piggyback. Note that all **open** or **close** commands are not echoed. In this case, input to PWD11 has no echo either.

1. Type **open** to open the MAWS command shell.

   ```
   Service connection opened (COM0)
   / >
   ```

2. Type **open DSI486_1_1** to open a pass-through connection to the serial line.

   ```
   / > open DSI486_1_1
   Terminal I/O re-routed to DSI486_1_1
   ```

3. `Type` **open 2** to open the PWD11 command shell.

   ```
   1 PWD OPENED FOR OPERATOR COMMANDS
   >
   ```

   You can now use the commands described in the PWD11 sensor user's guide to perform configuration and maintenance operations.

4. To close the connection, type **close**.

   ```
   Terminal I/O restored to ADCL shell
   Service connection closed
   ```

NOTE Some sensors require that you first close their service connection. Include the device identifier, for example **close 1**.

Close the sensor service connection first, and then close the MAWS connection using the **close** command alone.

Configuring Sensor Interface

Serial sensors have and use their own configuration interfaces. In addition to defining the communication parameters, there is typically very little to configure with Lizard setup software.

Proceed as follows:

1. Add and configure the communication interface module using the **Hardware Setup** view, see Figure 71 below.

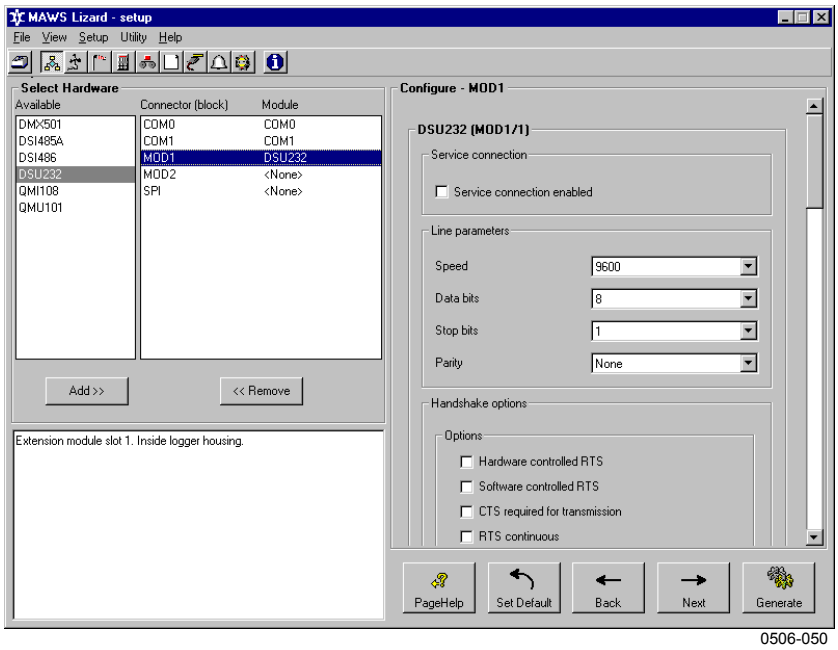
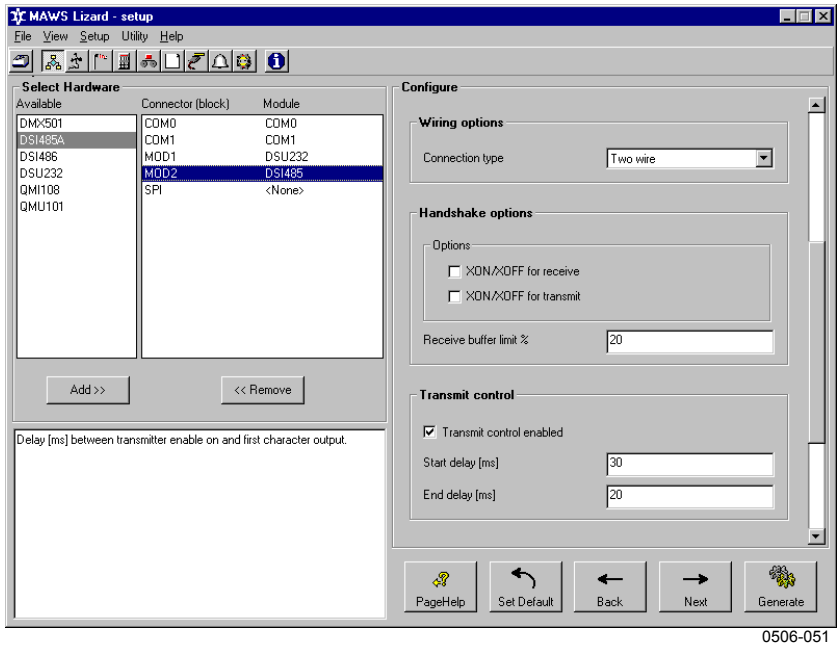


Figure 71 Hardware Setup View: Configuring the Communication Module

Note that you should use the default communication parameters of the sensor. These are not automatically generated by Lizard, so you need to enter them manually.

If you are using 2-wire RS-485, make sure that the **Transmit control** option is selected, and that the **Start** and **End delays** are suitable for the connected sensor. Usually, you can leave the default values, but adjustments may be necessary especially if you are connecting multiple sensors to same serial line. See Figure 72 on page 109 for the options.



0506-051

Figure 72 Hardware Setup View: Defining Transmit Control Parameters

You do not need to select the **Service connection enabled** option in order to have service access to the sensor. Selecting this option in fact enables service access to MAWS through the port.

2. Proceed to the **Equipment** view to add and connect the sensor, see Figure 73 on page 110.

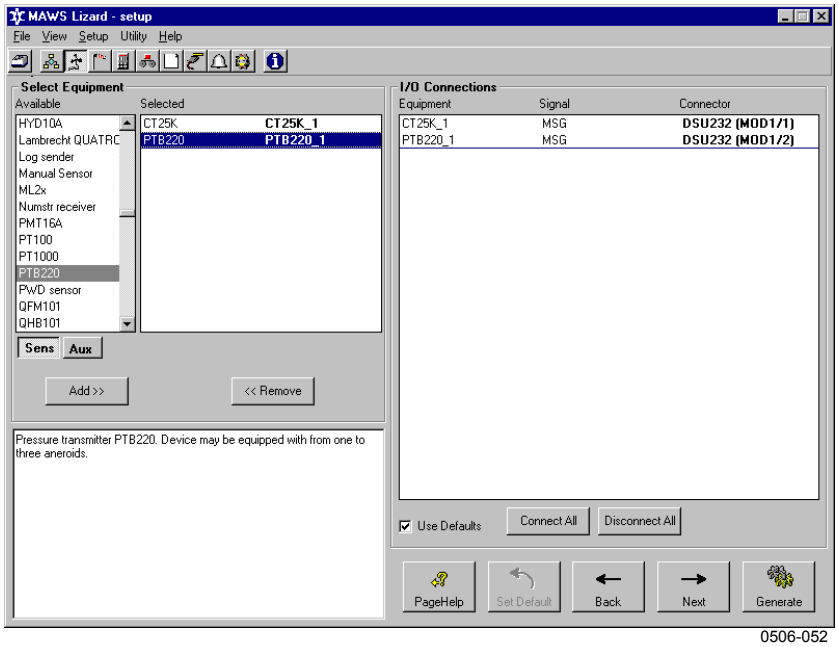


Figure 73 Equipment View: Adding and Connecting the Sensor

Note that serial sensors do not have default connectors, so you need to connect the sensor manually to the selected port.

The first number of the connector identifier MODX/X (for example, MOD1/1) indicates the piggyback slot: 1 is the one closer to the battery holder and 2 is the bottom one. The second number is present only if you are using a dual port board such as DSU232 or DSI486. It indicates the channel number, 1 or 2. For more information, refer to a MAWS user's guide and the section on module places.

3. If you are connecting multiple sensors to the same serial line, the following window will open. Click **Yes**.

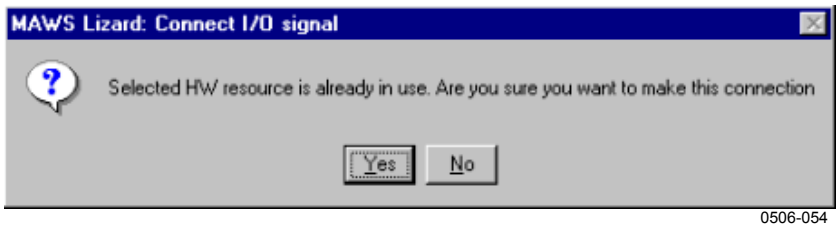

MAWS Lizard: Connect I/O signal
Selected HW resource is already in use. Are you sure you want to make this connection
Yes
No
0506-054

Figure 74 Connect I/O Signal Window

4. Proceed to the **Measurements** view to configure the sensor interface, see Figure 75 on page 111.

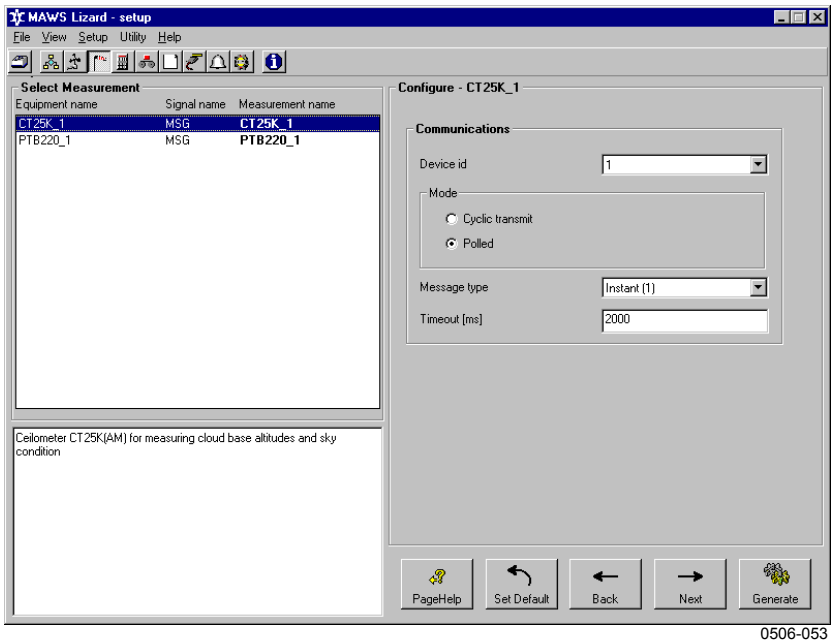


Figure 75 Measurements View: Configuring the Sensor Interface

Typical items to configure include the following:

Item	Description / Use
Device ID	Device identifier (must be entered) - Same as the set - Unique for each sensor if multiple devices are connected to the same serial line Used by - Polling and data reception to identify the device - Open commands to identify which device should open its service interface
Mode	Configuration for automatic or polled operations as described in section Data Acquisition Methods
Message Type	Many devices support data messages with different contents. This item selects the expected message type.
Timeout	Timeout for data reception. If no new data is received within this period of time, sensor data in reports and logs is marked as invalid until new data is received. Timeout starts from: - Poll message transmit in polled mode - Message reception in automatic transmit mode

NOTE The settings described above apply only to MAWS. You must also configure the sensor to have matching settings.

Serial Sensor Interfaces

This chapter describes the following options in detail for each sensor:

- Default communication parameters
- Typical sensor interface configuration alternatives
- Data availability with different message types. This refers to the availability of sensor output variables used in the setup for calculation, logging and reporting.
- Sensor-specific issues, such as MAWS shell commands

Present Weather Sensors PWD11, PWD21 and FD12P

These present weather and visibility sensors are covered in the same chapter as they produce similar data and share message structures.

Default communication parameters:

Parameter	Value
Speed	*9600 bps (PWD11, PWD21) / 300 bps (FD12)*
Parity	*even*
Data	*7*
Stop	*1*
Handshake	*none*

Sensor commands for interface configuration:

Operation	Command(s)	Purpose / Note
Set polled	AMES 2 0 or AMES 7 0	Disables automatic transmission
Set automatic tx	AMES 2 30 or AMES 7 30	Enables automatic transmission of message 2 or message 7 (PWD21 / FD12P only) with 30 second interval
Set device id	CONF	Activates configuration dialog

Message availability by sensor type:

Sensor	Messages
PWD11	2
PWD21	2, 7
FD12P	2, 7

Available data with FD12P:

Lizard variable	Message	Description
pwd_id	2,7	Header text
dev_id	2,7	Device ID
alarms	2,7	Device alarm code
vis_1	2,7	Visibility 1 min average
vis_10	2,7	Visibility 10 min average
pw_nws	2,7	Present weather NWS code
pw_inst	2,7	Instant present weather code
pw_15	2,7	15 min present weather code
pw_1h	2,7	One hour present weather code
water_1h	2,7	Precipitation intensity mm/hour
water_cum	2,7	Cumulative water sum
snow_cum	2,7	Cumulative snow sum
t_xarm	7	Crossarm temperature
lumin	7	Background luminance
metar_i	7	Instant METAR weather code
metar_r	7	Recent METAR weather code
pw_insttxt	2,7	WMO text for instant present weather code
pw_15txt	2,7	WMO text for 15 min present weather code
pw_1htxt	2,7	WMO text for one hour present weather code
water_inc	2,7	Water sum increment since prev. transmission
snow_inc	2,7	Snow sum increment since prev. transmission
orig_PWD	2,7	Original FD12P message

Available data with PWD11 and PWD21:

Lizard variable	Message	Description
pwd_id	2,7	Header text
dev_id	2,7	Device ID
alarms	2,7	Device alarm code
vis_1	2,7	Visibility 1 min average
vis_10	2,7	Visibility 10 min average
pw_nws	2,7	Present weather NWS code
pw_inst	2,7	Instant present weather code
pw_15	2,7	15 min present weather code
pw_1h	2,7	One hour present weather code
water_1h	2,7	Precipitation intensity mm/hour

Lizard variable	Message	Description
water_cum	2,7	Cumulative water sum
snow_cum	2,7	Cumulative snow sum
t_xarm	7	Crossarm temperature
lumin	n/a	Background luminance
metar_i	7	Instant METAR weather code
metar_r	7	Recent METAR weather code
pw_insttxt	2,7	WMO text for instant present weather code
pw_15txt	2,7	WMO text for 15 min present weather code
pw_1htxt	2,7	WMO text for one hour present weather code
water_inc	2,7	Water sum increment since prev. transmission
snow_inc	2,7	Snow sum increment since prev. transmission
orig_PWD	2,7	Original FD12P message

NOTE PWD11 can produce only message 2.

Ceilometers CL31, CT25K and CT25KAM

Ceilometers CL31, CT25K and its military version CT25KAM produce almost equal data using the same data messages.

Default communication parameters for service and data port:

Parameter	Value
Speed	*2400 bps*
Parity	*even*
Data	*7*
Stop	*1*
Handshake	*none*

Sensor commands for interface configuration:

Operation	Command(s)	Purpose / Note
Set polled	SET MESSAGE TYPE *<type>* SET MESSAGE MODE POLLING	Set message type, where *<type>* is MSG1, MSG6 or MSG 61. Disables automatic transmission.
Set auto tx	SET MESSAGE TYPE *<type>* SET MESSAGE MODE AUTOSEND	Set message type, where *<type>* is MSG1, MSG6 or MSG 61. Enables automatic transmission.
Set ID	SET UNIT_ID *<ID>*	Set unit ID, where *<ID>* is a single character 1...Z.
Set interface type	SET PORT DATA INTERFACE *<type>*	Set interface type for the data connection. *<type>* is RS-232 or RS-485_2W.

Message availability by sensor type:

Sensor	Messages
CT25	1, 6
CT25KAM	1, 61

NOTE In order to have messages 6 or 61 available, you need to purchase the sky condition option separately.

Available data:

Lizard Variable	Message	Description
Header	1,6,61	Header text (first line data)
GenStat	1,6,61	Status information field
meas_1	1,6,61	Raw measure 1
meas_2	1,6,61	Raw measure 2
meas_3	1,6,61	Raw measure 3
HWStat	1,6,61	Hardware status bits (hex format)
oktas_1	6,61	Octas in layer 1
height_1	6,61	Height of layer 1
oktas_2	6,61	Octas in layer 2
height_2	6,61	Height of layer 2

Lizard Variable	Message	Description
oktas_3	6,61	Octas in layer 3
height_3	6,61	Height of layer 3
oktas_4	6,61	Octas in layer 4
height_4	6,61	Height of layer 4
oktas_5	61	Octas in layer 5
height_5	61	Height of layer 5
d_stat	1,6,61	Detection status
base_1	1,6,61	Height of cloud base 1 (*
base_2	1,6,61	Height of cloud base 2 (*
base_3	1,6,61	Height of cloud base 3 (*
v_vis	1,6,61	Vertical visibility (*
h_sig	1,6,61	Highest signal (*
i_stat	1,6,61	Hardware status bits (integer format)
orig_CT	1,6,61	Original CT25 message

*) These are meas_1 to meas_3 values processed according to the detection status. Values are exclusive. For example, if cloud bases are shown, vertical visibility and highest signal are missing and vice versa.

Digital Barometer PTB220

Default communication parameters:

Parameter	Value
Speed	*9600 bps*
Parity	*even*
Data bits	*7*
Stop bits	*1*
Handshake	*XON/XOFF*

Sensor commands for interface configuration:

Operation	Command(s)	Purpose / Note
Set polled	SMODE POLLED	Set sensor to polled operation
Set auto tx	INTV <*time*> <*unit*> SMODE RUN	Select transmit interval to <*time*> <*unit*>, for example 10 s. Set sensor to automatic transmit mode.
Set format	FORM	See detailed explanation below

Operation	Command(s)	Purpose / Note
Set ID	ADDR *<id>*	Set device id for polled operation. *<id>* = 0 ... 99
Activate param	RESET	New parameters are taken into use after reset.

To get a suitably formatted data output from the PTB220 sensor, the following message format string must be given using the **FORM** command. Note that the string is almost of maximum length allowed, so do not insert any extra spaces. Proceed as follows:

1. Type **FORM <CR>**. This command outputs the current format string and prompts `?` for a new one.
2. Copy the string below to the terminal and press **<CR>**.

```
#001"PTB"ADDR #002ERR " "4.2P " "TREND " "A " "P1 "
"P2 " "P3 #003CS4 #r#n
```

NOTE After configuring the sensor, enter the **RESET** command in order for the changes to take effect.

Available data:

Lizard Variable	Description
ptb_id	Device identifier with address, for example 'PTB2'
err	Error flags
P_avg	Pressure average
trend	Three hour pressure trend
tend	Pressure tendency
P1	Pressure measure #1
P2	Pressure measure #2 (*
P3	Pressure measure #3 (*
sum	Message checksum (hex)
orig_PTB220	Original message string

(* All possible data is available with the output format explained previously. Availability of the variables P2 and P3 depends on the number of installed aneroids.

Ultrasonic Wind Sensor WS425

Default communication parameters:

Parameter	Value
Speed	*9600 bps*
Parity	*none*
Data bits	*8*
Stop bits	*1*
Handshake	*none*

The sensor has a menu-driven configuration interface, which is shown right after the service connection has been opened with the **open** command.

Menu selections for interface configuration:

Operation	Menu Selection	Purpose / Note
Set format	Operation Mode -> Handar RS-232	Select correct output mode.
Set units	Wind speed units -> Meters/second	By default, MAWS assumes wind calculation speed input to be in meters/second.
Set polled	Output Interval -> 0	Disables automatic transmission.
Store param	Save Configuration	Store modified parameters permanently.

NOTE The MAWS interface for Ultrasonic Wind Sensor WS425 currently supports only the **Handar RS-232** mode.

Available data:

Lizard Variable	Description
type	Message type, always 'W'
avg_time	Averaging time [s]
dev_stat	Device self test status
WD	Wind direction in [deg]
WS	Wind speed [m/s]
unit	Speed unit, always 'T' with MAWS
sum	Eight-bit sum for message, presented in hex ASCII. See user's guide for details

WT500 Series Wind Transmitters

The WT500 series wind transmitter can be used to interface with different types of wind sensors, and optionally with the humidity probe HMP45 for temperature and humidity measurement.

Default communication parameters:

Parameter	Value
Speed	*1200 bps*
Parity	*none*
Data bits	*8*
Stop bits	*1*
Handshake	*none*
RS-485 mode	*4-wire*

Sensor commands for interface configuration:

Operation	Command(s)	Purpose / Note
Set wind data format	SETMES 1 TYPE <*value*>	Set wind data format where <*value*> is MWV for autosend operation and MWVQUERY for polled.
Set TU data format	SETMES 2 TYPE XDR_TU	Set temperature and humidity data format (*.
Set output port	SETMES 1 COM 0 SETMES 2 COM 0	Output both messages to the onboard port 0. Another alternative is 1 if there is an additional communications module installed in the WT5XX.
Set autosend intervals	SETMES 1 INTERVAL 1.0 SETMES 2 INTERVAL 60.0	Set wind data interval to 1s. Set temperature and humidity data interval to 60s (*.
Set ID	SETDEV id <*value*>	Set the device identifier, where <*value*> is an uppercase letter A ... J.
Set interface mode	SETCOM 0 WIRES <*value*>	Select the interface mode for the onboard communications port. Set value 4 to use RS-232 or 4-wire RS-485, and value 2 to use 2-wire RS-485.
Activate param	RESET	New parameters are taken into use after reset

(* Required only if temperature and humidity measurements are used. If so, you must also enable XDR_TU reception in the **Measurements** view of Lizard.

NOTE MWVQUERY format can only be used alone. If you are using XDR_TU, you must use the MWV format for wind data transfer, and operate WT5XX in an automatic transmission mode.

NOTE After configuring the device, enter the **RESET** command in order for the changes to take effect.

Available data by message type:

Lizard Variable	Message	Description
mwv_hdr	MWV(QUERY)	MWV message header
dir	MWV(QUERY)	Wind direction [deg]
ref	MWV(QUERY)	Reference. R=relative, T=true
spd	MWV(QUERY)	Wind speed
uni	MWV(QUERY)	Wind speed unit. K=km/h, M=m/s, N=kt
mwv_sta	MWV(QUERY)	MWV status field and checksum (*
orig_WT50_mwv	MWV(QUERY)	Original receive string
ta_typ	XDR_TU	Transducer type: C for Ta
ta	XDR_TU	Air temperature
ta_uni	XDR_TU	Ta. unit: C for ºC
ta_id	XDR_TU	Transducer ID for Ta
rh_typ	XDR_TU	Transducer type: H for RH
rh	XDR_TU	Relative humidity
rh_uni	XDR_TU	RH unit: P for %
xdr_sta	XDR_TU	Misc. XDR status (*
orig_WT50_xdr	XDR_TU	Original receive string

GARMIN GPS35-PC GPS Receiver

Default communication parameters according to NMEA 0183:

Parameter	Value
Speed	*4800 bps*
Parity	*none*
Data bits	*8*
Stop bits	*1*
Handshake	*none*

No initial configuration is needed. The device automatically starts outputting GPRMC data at one-second intervals.

Available data by message type:

Lizard Variable	Description
gp_hdr	GP message header
utc_t	GPS UTC time HHMMSS
gps_status	GPS status A = Valid position V = NAV receiver warning
lat	Latitude, ddmm.mmmm
lat_h	Latitude hemisphere, N or S
long	Longitude, dddmm.mmmm
long_h	Longitude hemisphere, E or W
utc_d	GPS UTC date DDMMYY
orig_ggps35_gp	Original receive string

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CHAPTER 8

ALARMS

This chapter provides information on output control using alarms.

Output Control Using Alarm

A free measurement channel excitation output from channels CH0 to CH3 can be used as a digital output, although MAWS has no real digital outputs. The **Set excitation output** alarm provides a means for controlling these outputs using the MAWS alarm functionality. With this option you can, for example, close a relay contact when the alarm condition is met.

Follow the procedure below to create and configure an output control using an alarm.

1. Before configuring the alarm itself, you have to create an excitation control and connect it to the desired output in the **Equipment** view, refer to Figure 76 on page 124.

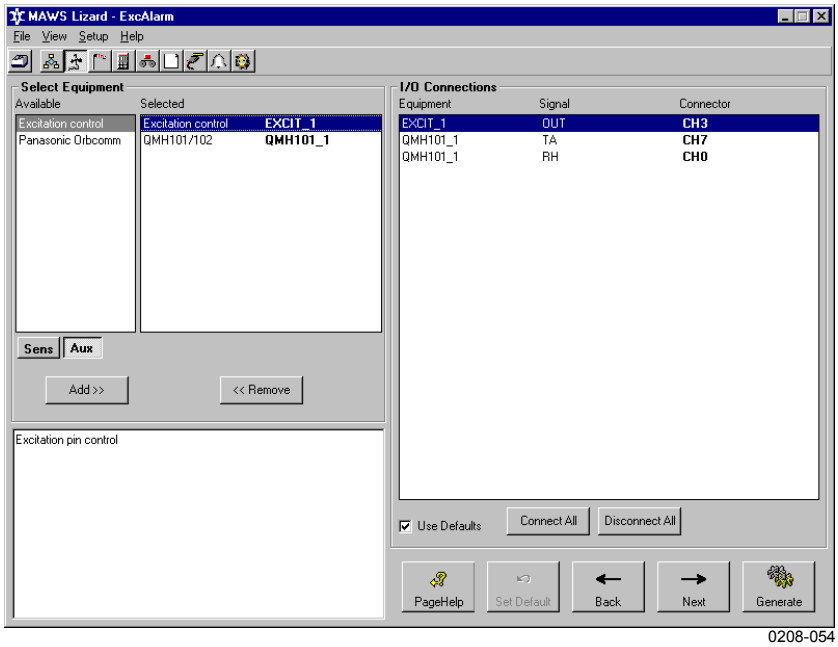

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Figure 76 Configuring the Excitation Output Control

2. Select the **Alarm** view and create a new alarm with the type **Set excitation output**, refer to Figure 77 below.

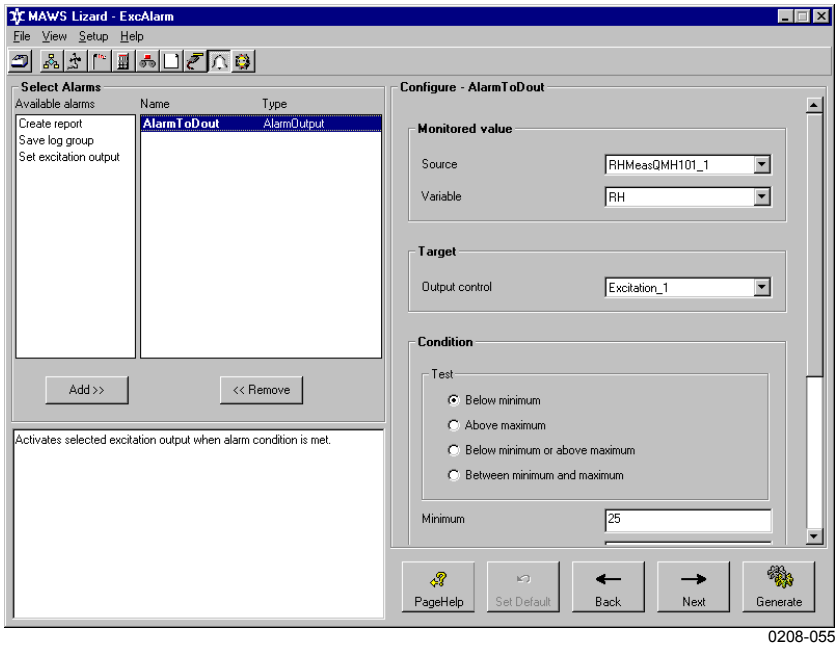

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Figure 77 Configuring an Excitation Output Alarm

3. Configure the alarm similarly as the report and log alarms with the following exceptions:

- You do not need to enter any separate alarm on and off targets.
- Output is always on as long as the alarm condition exists, that is, the option for triggering the action on each test is missing.

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CHAPTER 9

ADDITIONAL FEATURES

This chapter provides information on other features or enhancements to MAWS Lizard.

Floating Point Numbers in Static Parameters

In MAWS version 4.07 or earlier, floating point numbers are stored in the static parameters as 32-bit floating point numbers (**float**).

In MAWS version 5.01 or higher, the floating point numbers use a 64-bit floating-point number (**double**).

Enhanced Generic Frequency Measurement

MAWS version 4.07 or higher includes an enhanced generic frequency measurement feature. You can select between two frequency measurement modes that are optimized for their respective ranges:

- Low frequency: frequencies up to 2 kHz
- High frequency: frequencies up to 20 kHz.

In the **Measurements** view, use the **Frequency mode** frame to select the optimized range, see Figure 78 on page 128. For more information, see also the online help in the information pane.

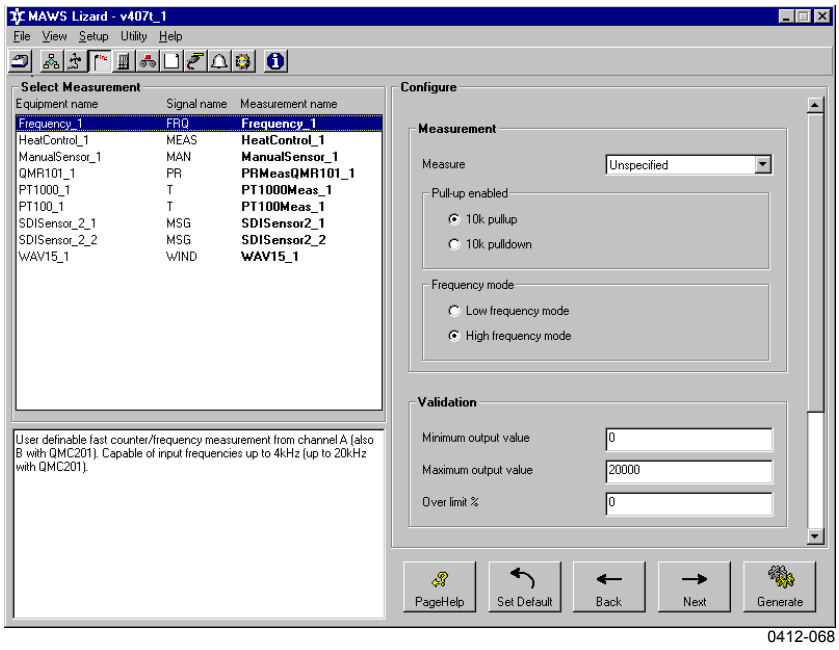

Figure 78 Measurements View: Selecting the Frequency Mode

Passive FTP Mode with iConnector

Due to firewall configurations, it is sometimes necessary to use a passive FTP mode to send files to an FTP server. When you select the **Use passive mode FTP** option, iConnector uses passive mode FTP sessions. Hence, iConnector uses the **PASV** command instead of **PORT** when opening an FTP session.

The default selection is **PORT** call, but you can change iConnector to use the passive FTP by selecting the **Use passive mode FTP** option in the **Communications** view. See Figure 79 on page 129. In general, you should not select this option, but it may be required in some firewalled environments.

For a detailed description of this feature, refer to the FTP standard (RFC 959).

For a more detailed description on how to configure FTP file sending, refer to the Configuring Modem Options Technical Reference.

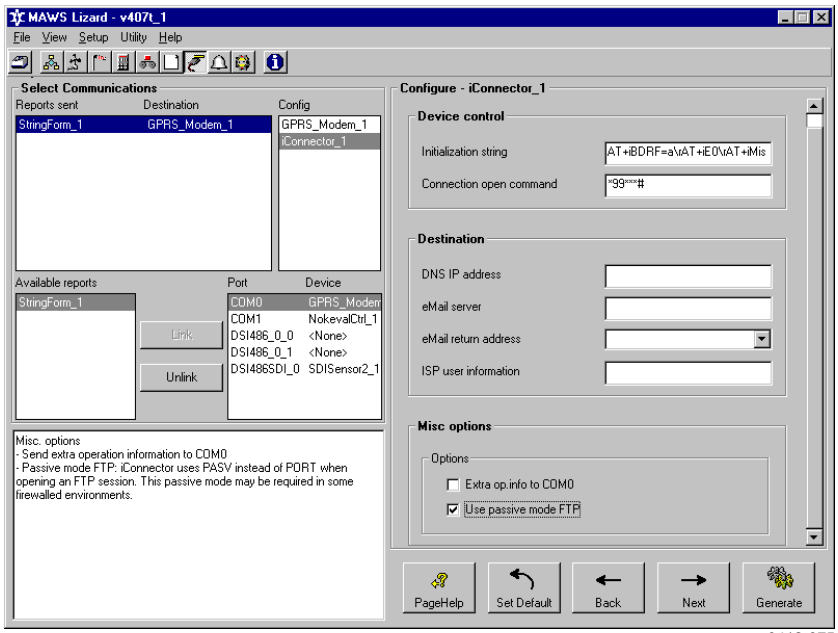

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Figure 79 Communications View: Use Passive Mode FTP Option

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APPENDIX A
SENSOR STATUS LIST

Table 13 Sensor Status List

Value	Meaning	Notes
0	The sensor is working properly (OK)	
1	Not measured yet	
2	Interface is not initialized	1)
3	Communication timeout has occurred	1)
4	Unknown data is received	1)
5	Communication is functioning, but the sensor reports errors. Use sensor's own service interface to find out cause	1)
6	Sensor communication is paused because service connection is opened through MAWS	1)
7	Message sequence numbers are overlapping in the Autotrac satellite transceiver interface	1)
8 ... 19	Not available	
20	Excitation failure is caused by the overload in the excitation output	2)
21	The input voltage is out of range or the A/D conversion has failed due to an internal error	2)
22	Sensor is disconnected or the connection cables are broken	2)
23	Sensor output exceeds the min/max limits defined in the **Measurements** view	2)
24	Change in sensor output has exceeded the maximum step defined in the **Measurements** view	2)
25	An internal configuration error has occurred	2)
26	Error in reference measurement, which is usually caused by damaged sensor/logger or electrical interference	2)
27	Internal voltage error occurred or the logger is damaged	2)
28	PMT16 calibration data error	2)
29	Data is invalid for unspecified reason	2)
30	The measurement or the sensor has been manually disabled	
99	Sensor status is not supported	

1) Value is available only for the sensors with the serial interface.
2) Value is available only for the sensors with a conventional, that is, analog or counter/frequency interface.

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